AFIT/GEE/ENV/94S-13



# OPTIMAL UTILIZATION OF FIELD GENERATED ANALYTICAL DATA FOR SITE CHARACTERIZATION AND REMEDIAL DECISION MAKING

THESIS

Ronald J. Lester, GM-13

AFIT/GEE/ENV/94S-13



Approved for public release; distribution unlimited

AFIT/GEE/ENV/94S-13

# OPTIMAL UTILIZATION OF FIELD GENERATED ENVIRONMENTAL ANALYTICAL DATA FOR SITE CHARACTERIZATION AND REMEDIAL DECISION MAKING

## THESIS

Presented to the Faculty of the School of Engineering

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the
Requirements for the Degree of

Master of Science in Environmental Engineering and Management

| Accesion For | |
|---|---|
| NTIS CRA&I | ✓ |
| DTIC TAB | ☐ |
| Unannounced | ☐ |
| Justification | |
| By | |
| Distribution / | |
| Availability Codes | |
| Dist | Avail and / or Special |
| A-1 | |


Ronald J. Lester

GM-13


September 1994

## Preface

The purpose of this study was to develop a method for assessing the appropriate quality of environmental analytical data for use in remedial decision making; specifically in risk assessment calculations. These data quality assessment criteria could then be used in the evaluation of field generated data. A majority of the hazardous waste site characterization studies conducted to date have relied heavily on data generated under the EPA Contract Lab Program protocol, at great cost and time. The increased dependence on field generated data in place of the CLP data could potentially save the responsible parties (particularly the DOD) significantly in site restoration costs and time for clean-up.

In my development of data quality standards for which to use in assessing field data useability, and the testing of these standards on actual data sets, I relied heavily on the support and direction of many. My deepest appreciation goes to Maj Jim Aldrich, my faculty advisor, who had the ability to understand what I desired to accomplish and kept me on the right track toward developing something that can potentially be useful to many. Dr. Charles Bleckmann, my other committee member and reader, was also very supportive in my efforts and his assistance was extremely helpful. I also wish to thank Mr. Jaime Marshall of Martin-Marietta for several hours of his valuable time in supplying me with great insight into the technical and regulatory aspects of environmental sampling and analysis and his gracious offering of endless data and documentation for testing my ideas. The Restoration Branch of the Wright-Patterson Air Force Base Office of Environmental Management, especially Mary Seitz and Tim Clendenin, was also extremely supportive in the supply of endless data and allowing me to continually pilfer their technical library.

Last and definitely not least I wish to express my most sincere gratitude to my wife Colleen and my two all-stars Ryan and Todd for putting up with me over the last several months as I fought with the data and my computer trying to make some sense of it all.

Table of Contents


Page

Preface . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ii

List of Figures . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . vi

List of Tables. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . viii

Abstract . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . x

I. Introduction. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1

General Issue . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2
Specific Problem . . . . . . . . . . . . . . . . . . . . . . . . . . . 3
Research Objectives . . . . . . . . . . . . . . . . . . . . . . . . . 4
Scope of Research . . . . . . . . . . . . . . . . . . . . . . . . . . 5

II. Background. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 8

CERCLA and the IRP . . . . . . . . . . . . . . . . . . . . . . . . . 8
Necessary Level of Analytical Accuracy and Precision . . . . . . . . . . 10
Reliance on EPA Contract Lab Program. . . . . . . . . . . . . . . . . 11
EPA Data Quality Objectives . . . . . . . . . . . . . . . . . . . . . 14
Potential for Increased Reliance on Field Analyses. . . . . . . . . . . . 16
Field Analysis Versus CLP (or Off-site) Analysis . . . . . . . . . . . . 17
Potential Error . . . . . . . . . . . . . . . . . . . . . . . . . . . . 20
Data Useability Criteria . . . . . . . . . . . . . . . . . . . . . . . 21
Measures of Acceptability. . . . . . . . . . . . . . . . . . . . . . . 26

III. Methodology . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 27

Establishment of Minimum Standards for Useability of Field Data
Based on Risk Assessment Criteria . . . . . . . . . . . . . . . . . . 27

Reports to Risk Assessor . . . . . . . . . . . . . . . . . . . 27
Documentation . . . . . . . . . . . . . . . . . . . . . . . . 27
Data Sources . . . . . . . . . . . . . . . . . . . . . . . . . 27
Analytical Methods and Detection Limits. . . . . . . . . . . . 28
Data Review . . . . . . . . . . . . . . . . . . . . . . . . . 29
Data Quality Indicators . . . . . . . . . . . . . . . . . . . . 29

Application of Minimum Standards for Field Data . . . . . . . . . . . . 31

Groundwater. . . . . . . . . . . . . . . . . . . . . . . . . . 32

Soils . . . . . . . . . . 32

Cost Implications of Reliance on Field Generated Data. . . . . . . . . . 32

IV. Analysis and Findings. . . . . . . . . . 34

Introduction. . . . . . . . . . 34
Development of Useability Standards for Analytical Data Bases . . . . . . 35

Qualitative Evaluation Criteria. . . . . . . . . . 35
Quantitative Evaluation Criteria . . . . . . . . . . 35

Data Sources. . . . . . . . . . 36
Analytical Methods and Detection Limits . . . . . . . . . 36
DQI--Completeness . . . . . . . . . . 37
DQI--Comparability . . . . . . . . . . 38
DQI--Precision. . . . . . . . . . 38
DQI--Accuracy . . . . . . . . . . 40

Summary of Useability Standards . . . . . . . . . . 42

Application of Standards to CLP Data Set. . . . . . . . . . 43
Application of Standards to Field Generated Data . . . . . . . . . . 48

Data Sources. . . . . . . . . . 49
Analytical Methods and Detection Limits--Water . . . . . . . . . 49
Analytical Methods and Detection Limits--Soil. . . . . . . . . . 50
Completeness . . . . . . . . . . 50
Comparability . . . . . . . . . . 51
Precision--Water. . . . . . . . . . 52
Precision--Soils . . . . . . . . . . 58
Accuracy--Water . . . . . . . . . . 60
Accuracy--Soils . . . . . . . . . . 68

Comparison of Field vs. CLP Generated Data . . . . . . . . . . 72

V. Potential Cost Implications of Reliance on Field Generated Data . . . . . . . . . 71

VI. Conclusions and Recommendations . . . . . . . . . . 77

Overview. . . . . . . . . . 77
Conclusions. . . . . . . . . . 78
Recommendations . . . . . . . . . . 82

Appendix A: Data Sheets for Relative Percent Difference Calculations--Water . . . . . . 84

Appendix B: Data Sheets for Relative Percent Difference Calculations--Soil . . . . . . 94

Appendix C: Data Sheets for Percent Recovery Calculations--Water . . . . . . . . . . . 140

Appendix D: Wilk-Shapiro Results of Percent Recovery Values in Water Data . . . . . 150

Appendix E: Data Sheets for Percent Recovery Calculations--Soil . . . . . . . . . . . 156

Appendix F: Wilk-Shapiro Results of Percent Recovery Values in Soil Data. . . . . . . 175

Appendix G: Water Data Comparison Tables for On-site Lab Generated Data Versus CLP (Off-site) Generated Data . . . . . . . . . . . . . . . . . . . 181

Appendix H: Soil Data Comparison Tables for On-site Lab Generated Data Versus CLP (Off-site) Generated Data . . . . . . . . . . . . . . . . . . . 200

Bibliography . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 219

Vita . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 222

## List of Figures


| Figure | | Page |
|---|---|---|
| 1 | Distribution of RPD Values for Benzene in Water | 53 |
| 2 | Distribution of RPD Values for Toluene in Water | 53 |
| 3 | Distribution of RPD Values for Ethylbenzene in Water | 54 |
| 4 | Distribution of RPD Values for Xylene in Water | 55 |
| 5 | Distribution of RPD Values for Chloroform in Water | 55 |
| 6 | Distribution of RPD Values for 1,1,1-TCA in Water | 56 |
| 7 | Distribution of RPD Values for Carbon Tet. in Water | 57 |
| 8 | Distribution of RPD Values for TCE in Water | 57 |
| 9 | Distribution of RPD Values for PCE in Water | 58 |
| 10 | Distribution of RPD Values for Xylene in Soils | 60 |
| 11 | Distribution of RPD Values for Chloroform in Soils | 60 |
| 12 | Distribution of %R Values for Benzene in Water | 62 |
| 13 | Distribution of %R Values for Toluene in Water | 63 |
| 14 | Distribution of %R Values for Ethylbenzene in Water | 63 |
| 15 | Distribution of %R Values for Xylene in Water | 64 |
| 16 | Distribution of %R Values for Chloroform in Water | 65 |
| 17 | Distribution of %R Values for 1,1,1-TCA in Water | 65 |
| 18 | Distribution of %R Values for Carbon Tet. in Water | 66 |
| 19 | Distribution of %R Values for TCE in Water | 66 |
| 20 | Distribution of %R Values for PCE in Water | 67 |
| 21 | Distribution of %R Values for Xylene in Soil | 69 |
| 22 | Distribution of %R Values for TCE in Soil | 69 |

List of Figures (Cont.)


| Figure | | Page |
|---|---|---|
| 23 | Chronological Presentation of %R Values for Benzene in Soil | 71 |
| 24 | Chronological Presentation of %R Values for Toluene in Soil | 71 |
| 25 | Cost Growth Curves for CLP vs. On-Site Analyses | 75 |

## List of Tables


| Table | | Page |
|---|---|---|
| 1 | VOC Prevalence at Contaminated Sites--"USA Superfund Sites" | 6 |
| 2 | Types of Data Collection | 11 |
| 3 | Tradeoffs Between Use of Field and Fixed Laboratories | 17 |
| 4 | Approximate Costs for Field and CLP Analysis for Volatile Organics | 19 |
| 5 | Impact of Data Useability Criteria in baseline Risk Assessment | 23-24 |
| 6 | Detection Limit Standards for Soils | 37 |
| 7 | Detection Limit Standards for Water | 37 |
| 8 | Comparison of Contaminants of Concern | 39 |
| 9 | RPD Standards | 39 |
| 10 | % Recovery Standards | 40 |
| 11 | Summary of Useability Standards | 43 |
| 12 | Detection Limits for CLP Data Set | 44 |
| 13 | CLP Matrix Spike Duplicate Precision Analysis | 45 |
| 14 | Blind Field Duplicate RPD Results | 46 |
| 15 | t-Test for CLP Analysis in Soils/Water | 47 |
| 16 | Analytical Detection Limits of On-Site Lab for Soils | 49 |
| 17 | Analytical Detection Limits of On-Site Lab for Water | 50 |
| 18 | Comparison of On-Site and Off-Site Detection and Quantitation Limits (in ppb) | 52 |
| 19 | Precision Analysis Results--On-Site Soils Analyses | 59 |
| 20 | Wilk-Shapiro Normality Test Results; Percent Recoveries--Soil Analyses | 61 |
| 21 | t-Test Results for % Recovery in Water Samples | 62 |
| 22 | Wilk-Shapiro Normality Test Results; Percent Recoveries--Soil Analyses | 68 |

List of Tables (Cont.)


Table | Page

23 t-Test Results for % Recovery in Soil Samples . . . . . . . . . . . . . 70

24 Comparison of Mean RPD in soils Analysis . . . . . . . . . . . . . . 81

## Abstract

This study developed data quality standards for assessing environmental analytical data quality and its use in remedial decision making, specifically in risk assessment calculations. Regulatory documentation was extensively reviewed and although it specified evaluation criteria for data useability, the regulatory guidance failed to clearly specify standards for quantitative measurement. This study attempted to fill that gap. The primary purpose was to increase the use of field generated data in environmental site investigations versus the continued reliance on costly and time consuming EPA Contract Lab Program data. Increased reliance on field lab data could significantly reduce remedial investigation costs.

The standards developed in this study are based on regulatory criteria for data useability, achievable quality in a CLP lab setting, and basic statistical methods. The standards were then applied to sets of Volatile Organic Compound data in water and soil matrices from CLP generated data from one Installation Restoration Program (IRP) site and field lab generated data at another IRP site. The CLP data failed the test for data useability based on the standards as established where the field generated data performed much better but also had its specific failures. The primary breakdown in the field data performance was with accuracy measurements in a soil matrix but an evaluation of chronological performance of the field lab indicated clear trends in the data and the potential for acceptable performance.

The results of the test of the standards on actual data sets indicate that the standards may be more stringent than necessary due to the poor performance of the CLP data. Also seen in the results is a strong performance of field labs in generating data of acceptable quality, especially when compared to the performance of the CLP data. With some further refinement of the standards established in this study, to be more consistent with CLP achievable data quality, a dependable method for the assurance of field data quality would be available to allow its increased use.

# I. INTRODUCTION

The current progression of the Air Force's Installation Restoration Program, as with any Superfund program, is very slow and costly. This is due to a number of factors, including: the unwillingness to make decisions based on less than perfect and complete information; the lengthy process specified in the environmental regulations; and the tendency for many overseeing agencies to conduct excessive detailed reviews. The primary cause of the slow pace and expense of Superfund work is the high costs and time associated with the generation and evaluation of analytical data from a given hazardous waste site. A previously completed remedial investigation project consisted of approximately 30% of the cost and schedule associated with lab work (Helms, 1994). Therefore, if government and industry reviewed the current ways of doing Superfund business, they could potentially implement changes to complete environmental restoration programs in a more economic and efficient manner. The objective of this research project is to evaluate one mechanism for streamlining the generation of reliable data for Superfund/IRP decisions by demonstrating the usefulness of field generated data versus the more typical off-site laboratory generated data (such as that generated under the U.S. EPA Contract Lab Program).

Once the concept of using field generated data in the IRP is demonstrated, this study presents the potential impacts on the Air Force IRP. Due to similarities between Air Force hazardous waste sites to sites controlled by other federal and privately owned entities, this assessment of potential impacts applies to any site being restored under the Superfund guidelines. By placing an increased reliance on field generated data for use in remedial decision making, subsequent cost savings can be realized and shown by comparison to recently completed projects having sole reliance on off-site generated data.

**General Issue**

In 1980, in response to the growing concerns over past waste disposal sites and their potential adverse effects on human health and the environment, congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or more commonly known as Superfund. The purpose of this new regulation was to identify, investigate and remediate all past hazardous waste disposal sites to clean-up anthropogenic contamination in the environment to health protective levels and to prevent any further degradation and existing or potential risks to human health. As a result, the EPA has identified approximately 37,000 hazardous waste sites to date with 1200 of those placed on the National Priorities List (NPL) of the worse sites in the nation (or Superfund list). The projected cost for clean-up of the NPL sites alone is approximately $30 billion (EPA, 1993c:I-1). The anticipated environmental restoration workload for federal facilities within the U.S. involves some 24,000 sites with an expected clean-up cost of $400 Billion and extending well into the next century (US EPA 1993:v). Of the federal agencies having responsibility for hazardous waste sites, the Department of Defense owns the majority. The DOD has an estimated 17,660 (Lindenhofen, 1993:169) suspected hazardous waste sites at nearly 1,900 facilities with an anticipated clean-up cost of approximately $25 Billion (US EPA, 1993:2). Approximately 25% (~4415) of the DOD sites are the responsibility of the Air Force. Of the DOD sites, approximately 28% have been closed out (requiring no further remedial activity) following the Preliminary Assessment; the first step in the IRP process. The remaining sites (approximately 11,000) will require some level of site investigation, including environmental sampling and analysis (Lindenhofen, 1993:171).

Of the great number of CERCLA environmental site investigations completed, in progress or pending on federal or private facilities, the primary contribution of costs is associated with full characterization of the hazardous contaminant conditions are attributable to laboratory analytical work. Chemical analyses are necessary to accurately assess the presence and extent of synthetic chemical compounds within the various environmental media potentially harming human health or

the environment. The proportion of the overall site investigation costs associated with analytical costs has been as high as 30% at Air Force Materiel Command facilities (Helms, 1994). The Department of Energy (DOE) has estimated that over the next 30 years it will spend $15-45 Billion on analytical services alone (Robbat, 1992:15). If these costs are representative of all DOD facilities, with the average cost of a Remedial Investigation at Air force installations being approximately $5-15 Million, this implies the analytical portion of the cost is approximately $1.5-4.5 Million per site. These numbers represent a considerable amount of federal funds being expensed annually on analytical requirements alone, versus being put toward the primary goal of an environmental restoration program---the clean-up of hazardous constituents from the environment.

Although chemical analyses are a key portion of the IRP Remedial Investigation process, analytical requirements also play a role in follow-on CERCLA stages. Namely, once the remedy for site clean-up has been selected and implemented there is a continuing requirement for analytical evaluation of samples to monitor influent contamination levels into a treatment process or to assess the success of the remedy to reduce contaminant associated risks. Thus, the implications of an accurate and cost effective analytical program are wide spread throughout any environmental restoration program.

**Specific Problem**

Many studies and congressional inquiries in recent years regarding the CERCLA/IRP processes have targeted the excessive costs of the programs and the lengthy time to reach site clean-up. According to EPA data, the average duration of a Superfund (or IRP) project from the start of an RI/FS to the completion of a Remedial Action (construction of the final clean-up action in place) is approximately 9 years (Lindenhofen, 1993:173). The completion of an RI/FS alone averages nearly 3.5 years (Lindenhofen, 1993:173). Due to the major proportion of site

investigation and remedy costs tied to chemical analyses, this is an area of potential reduction of IRP program costs and duration.

Analytical costs are controlled by a number of factors, the most basic of which is the level of accuracy and precision required in analytical results. As mentioned above, within the CERCLA or IRP process there are considerable steps in a restoration program that require the collection and analyses of environmental samples. The question then arises regarding the existence of federal standards for data quality which must be met in conducting the collection and analyses of these samples to assure the legitimacy of the results. Such federal standards are vague at best, but the demands by individuals within regulatory organizations are often very strict.

In addition to the concern with overall CERCLA/IRP duration, a report released by an EPA council to study progress in federal facility restoration programs has expressed the need to expedite the timely release of federal facility restoration data to the stakeholders (e.g., public) (US EPA, 1993:15). There is an obligation to the public to further expedite the collection, analysis and reporting of environmental information. The utilization of field laboratories would assure analytical results are available in the most timely manner. The relative accuracy of this data is a resulting concern, but as is demonstrated in this study, the assurance of sufficient quality is possible to meet the information needs of the public.

**Research Objectives**

Much of the data generated at Air Force IRP sites is analyzed under the US EPA Contract Lab Program (CLP) protocol or some similar level of off-site laboratory analyses and reporting protocol. A variety of field analytical techniques are used to get a quick assessment of samples in the field but the actual application of these data to decision making processes have been limited due to the less stringent quality assurance and quality control (QA/QC) techniques as compared to the much more rigorous off-site (CLP) procedures. The extensive QA/QC procedures associated with CLP protocols may actually have limited value added to the resulting data. There exists an

opportunity for an increased reliance on field generated data, with less stringent QA/QC, for various decisions during the CERCLA/IRP site evaluation process. This study evaluates the necessary levels of data quality for use in environmental risk assessment and uses them in a comparison of QA/QC results from field generated and CLP analytical data. The assessment enforces the increased reliance on field generated data for decision purposes despite its weaker QA/QC procedures.

The research objectives of this study establish a set of criteria for judging the overall quality of analytical data for its use in many aspects of the CERCLA process; specifically the baseline risk assessment. The main purpose of these standards is for use in evaluating the useability of field generated environmental data. Data generated via CLP protocol with its extreme QA/QC procedures typically requires considerable time, along with the considerable costs, as compared to the generation of field data. Although the additional costs associated with CLP data result in data of the highest QA/QC, this higher level of QA/QC may not be necessary to generate useful data. Field generated data can be increasingly relied upon for expediting the decision process and reducing program costs. This study also compares field generated data with a baseline of CLP generated data to display that field data consists of sufficient accuracy and precision (as compared to CLP data) for use in CERCLA/IRP remedial decisions.

**Scope of Research**

The scope of the research was to establish statistically based criteria for evaluating the overall quality of analytical data for use in an environmental risk assessment. These criteria were then used to evaluate existing quality assurance and quality control data from differing media and on differing contaminants. Actual data from ongoing Air Force IRP studies was gathered and utilized in the application of the established criteria. The evaluation concentrated specifically on data from Operable Units 1 and 2 at Wright-Patterson AFB.

The media most commonly sampled and analyzed for hazardous waste contamination at CERCLA/IRP site are soils and ground water. This is true for the WPAFB IRP projects and is where the vast majority of the field analytical data exists. Therefore, this study was limited to the evaluation of the useability of field analyses on soils and ground water (the primary exclusion being the air media).

There are three categories of organic analyses: volatile, base/neutral/acid extractables (or semi-volatiles), and pesticides/PCBs (Neilsen, 1991:516). This study was also limited to the establishment of quality standards for Volatile Organic Compounds (VOCs) and the evaluation of useability of VOCs. Specific VOC's used were: benzene, toluene, ethylbenzene, xylene, tetrachloroethene, trichloroethene, carbon tetrachloride, chloroform, and 1,1,1-trichloroethane. These represent the most common fuel and solvent components known to pose a threat to human health and/or the environment (Table 1). This limitation is appropriate since a majority of the Superfund sites are contaminated by petroleum products and byproducts, the primary constituents of concern being VOCs. Of all sites to be investigated and remediated in the intermediate term (3-5 years), 60% of them have VOC contamination (Foley, 1994). This holds true with U.S. Air Force IRP site contamination where 60% of the sites involve petroleum products (Walsh, 1994). Volatile organics also typically have very low acceptable concentration limits (e.g., clean-up standards or drinking water standards) which make them a worse case representation of contaminants for this evaluation.

**TABLE 1**
VOC PREVALENCE AT CONTAMINATED SITES
"USA Superfund Sites"

| | Rank | % |
|---|---|---|
| Trichloroethene | 1 | 35 |
| Toluene | 3 | 27 |
| Benzene | 5 | 23 |
| Chloroform | 6 | 20 |
| 1,1,1-TCA | 8 | 17 |
| Tetrachloroethene | 9 | 17 |
| Xylene | 14 | 13 |
| Ethylbenzene | 15 | 12 |
| Carbon Tetrachloride | 27 | 7 |

(Siegrist, 1991)

The quality standards established herein were applied to both on-site and CLP data sets to assess the useability of each for IRP (and other CERCLA programs) decision making. Details of analytical techniques for field methods and off-site methods are not reviewed or assessed, but the methodologies and analytical quantification limits used are appropriately identified. The application of the quality standards indicates similarities between on-site and CLP data quality performance. This indicates an opportunity for cost and time savings in restoration programs with a very limited sacrifice in overall data quality, and thus, decision uncertainty.

## II. BACKGROUND

### CERCLA and the IRP

In 1980, in response to the growing concerns over past waste disposal sites and their potential adverse effects on human health and the environment, congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The purpose of this regulation was to identify, investigate and remediate all past hazardous waste disposal sites to clean-up anthropogenic contamination in the environment; and to prevent any further degradation and existing or potential risks to human health. The Department of Defense has established the Installation Restoration Program (IRP) to fulfill its responsibilities to meet the requirements established under CERCLA and amended the program as required by the Superfund Amendments and Reauthorization Act (SARA). The clean-up process specified in the National Contingency Plan (NCP), the implementing regulation for CERCLA mirrored in the IRP, involves procedural steps to assure the systematic and complete removal of all health threats posed by hazardous contamination within the environment.

Once a site is identified by one of many available administrative or technical mechanisms (Preliminary Assessment) the initial on-site step is to verify the presence of an existing or potential unacceptable level of hazardous constituents in the environment (Site Inspection). The NCP specifies that this step is necessary to collect or develop additional data, as appropriate, to better characterize the site for a more effective and rapid initiation of the following, more detailed, investigations or response (Federal Register, 1990:8845). This step may require some collection and laboratory analysis of environmental media samples such as soils, surface waters, ground waters, air, or wastes.

In planning for follow-on investigatory work, or during the site inspection, the EPA identifies the need for a Limited Field Investigation (LFI) to gather data for completion of a site conceptual model defining all potential contaminant transport mechanisms, pathways, and

receptors. Data to be collected for this purpose should be restricted to that which is easily attainable in a quick manner (EPA, 1991a:242). This would be an ideal opportunity for the use of field instrumentation.

The following stage, the Remedial Investigation/Feasibility Study (RI/FS), is intended to fully characterize the existing site conditions including levels of contamination and extent of contamination and evaluate potential remedies (Federal Register, 1990:8847). The EPA stresses the importance of the Remedial Investigation/Feasibility Study (RI/FS) stage of the CERCLA process due to its three main objectives. First, the RI is intended to be a complete field program for collecting data of known and acceptable quality to evaluate the type, extent, and magnitude of contamination in all environmental media. Second, the RI/FS is also used to determine the present and future risks to human health and the environment posed by an IRP site. The last objective of the RI/FS is to develop and evaluate all practical remedial action (clean-up) alternatives (EPA, 1991a:2-23). To sufficiently meet all of these objectives of the RI/FS a facility must conduct significant environmental sampling and analysis to complete an accurate assessment of the current contaminant make-up and distribution at the site. This can mean the collection and analysis of hundreds to thousands of environmental samples.

The final stages of the CERCLA/IRP process involve the selection of the appropriate site remedy, design of the remedial action (or clean-up), and implementation of the selected remedial action including any follow-on operations/maintenance or long-term monitoring. These stages involve chemical and analytical testing for the purpose of determining the achievement of clean-up action levels as specified in the site Record-of-Decision (ROD) (Federal Register, 1990:8852). Once all this is complete, or at any time during the process that analyses show a site presents no threat, the site is considered to be "clean" and eliminated from further IRP/CERCLA action.

**Necessary Level of Analytical Accuracy and Precision**

Within the US EPA guidance documentation there are numerous references to "data of acceptable quality," "legally defensible data," and "appropriate quality control and documentation" [EPA, 1990:46] but there is no definition of standards for these criteria. Although the Contract Lab Program (CLP) protocol in the EPA's CLP Statement of Work specifies acceptable analytical procedures, the Contract Required Quantitation Limits (the chemical specific quantitation levels that the CLP requires to be routinely and reliably quantitated in specified sample matrices) are listed but also recognized as not always achievable (EPA, 1991c:C-1). This is proof that although the EPA strives for data of utmost quality, accuracy, and precision, the definitions of such are very ambiguous and therefore specifications for acceptable data in the CERCLA/IRP decision making process are not clearly defined. As a result, there is much room for evaluating the relative accuracy and precision of the stringent off-site analytical procedures and its true benefits when compared to the costs associated with generating such data.

The above description of the CERCLA or IRP process indicates that there are considerable steps in a restoration program that require the collection and analyses of samples. There are three generally recognized levels of data based on the mode of generation potentially affected differently by any federal data quality standards; field screening, field analysis, and off-site analysis (Table 2). "Field screening" techniques are used to generate the most basic type of data. Field screening methods can offer an indication of the presence or absence of a chemical class and possibly whether that chemical class is above or below a threshold level, but is rarely used to quantify chemical specific information (EPA, 1993b:10-1). "Field analysis" methods are of higher reliability and wider use since they can provide chemical specific quantitative data in the field (usually in a field lab) (EPA, 1993b:10-1). "Off-site" or "fixed" lab analyses are conducted in a permanent laboratory away from the hazardous waste site which maintains a strictly controlled environment for assuring minimal interference with sample analyses. This study will pursue the establishment of evaluation criteria for the performance of field analyses based on typical

performance of off-site analyses and will evaluate the capabilities of field analyses to meet these standards.

**TABLE 2**
TYPES OF DATA COLLECTION

| TYPE | EXAMPLE | ADVANTAGES | DISADVANTAGES |
|---|---|---|---|
| Field Screening | Photo Ionization/Flame Ionization | -Portable<br>-Immediate Turnaround<br>-Less Expensive | -Limited to Particular Chemical or Chemical Class<br>-Only Relative Concentrations, Not Chemical Specific |
| Field Analytical | Field Gas Chromatograph (GC) | -Chemical Specific Analyses<br>-Quick Turnaround<br>-Less Expensive<br>-Lower Detection Limits | -Limited QA/QC<br>-Ambient (Lab) Environmental Effects Difficult to Control |
| Fixed Lab | GC/MS | -Ambient (Lab) Environmental Control<br>-Highest Qualitative Analyses | -Most Expensive<br>-Lengthy Turnaround |

**Reliance on EPA Contract Lab Program**

The US EPA has established some very stringent analytical and QA/QC procedures for the off-site analyses of environmental samples in its performance of Superfund hazardous waste site restoration projects. The development and implementation of these procedures is to assure legally defensible analytical results. Under it's Contract Lab Program (CLP), the EPA establishes protocols centered around clear and consistent "data acceptance criteria which results in data of known quality produced in a standardized package" (EPA, 1990:3). All EPA contracted laboratories are meant to follow these protocol. This legal defensibility of data is based on a detailed data validation process which identifies potential areas of data weakness through EPA on-site (laboratory) evaluations, performance evaluations, chain-of-custody evaluations and quality

assurance audits of data (Moody, 1992:12). Despite this intense and thorough review of data quality it can in no way capture and eliminate all possible error associated with sampling and analysis procedures.

These stringent protocols for analytical procedures and reporting requirements are often used in the completion of CERCLA investigative work (especially in DOD IRP actions) with the intent that the resulting data will meet the approval of overseeing regulatory agencies and thus be acceptable to the general public. The environmental regulatory agencies, as a precautionary measure, have adopted policies that identified hazardous waste sites potentially pose a serious threat to human health and the environment. Until appropriate investigations of the environment at and surrounding a site can disprove these conservative assumptions the agencies and the public view these sites as threats. Due to these regulatory policies and public caution the use by federal facilities of EPA procedures can give data a veil of reliability. Regulatory and public "acceptance" of facility operator generated data is deemed especially crucial when the lead agency makes a decision that a site does NOT pose a health threat and remedial efforts will be discontinued. This "No-Further-Action" decision is typically made based on extremely low levels of contamination or no identifiable contamination. Thus, this is where the importance of accurate contaminant identification and quantification capabilities becomes crucial.

There is a growing concern over a false sense of security from reliance on CLP protocol to assure data of the utmost quality and accuracy. In their paper titled "Data Quality Management Under Superfund: The Cost of Quality", Phillip Doherty et al recognize this weakness in CLP due to a lack of commitment to quality. They state:

> Commitment is not simply following a protocol or performing a data validation. Rather, it is the conscious, collective effort of the contractor, the lab, the client, and the regulatory authorities to work toward addressing and solving problems as they occur and not wait until the final report is issued. (Doherty, 1992:188)

This statement recognizes the increasing problem of relying on protocols, such as CLP protocols instead of professional judgment to judge data quality. It is further recognized that CLP protocols

are not a specific requirement of work conducted by the lead agency (e.g., Air Force, Army, DOE, etc.) and that project specific standards can be established as long as they meet the approval of the EPA prior to initiation and acceptance of the analytical work (this is true for NPL sites and a generally accepted practice at non-NPL sites). The CLP program is not a lab certification program but is strictly a contractual arrangement with participating labs which are required to pass on-site audits and to successfully assess performance evaluation (PE) samples (Nielsen, 1991:531). Therefore, any off-site lab can meet the standards established by the CLP (via audits, PE samples, etc.) but not actually be a participant in the EPA's lab program. As a result, those sites that do not use the CLP protocol will typically continue to use off-site laboratories with somewhat different protocols but will still be sufficiently strict concerning procedures and reporting requirements to assure reliable results that are acceptable to the regulators. Either way, the costs for such off-site analyses and the time for generation and verification of results are high. Environmental project managers should weigh the actual benefits of an increased comfort level with CLP/off-site results as compared to a less expensive and otherwise sufficiently accurate method of data generation (e.g., field analytical).

Part of the reason for DOD programs using CLP protocol to the great extent they are is the language in the various EPA guidance documents encouraging the use of CLP procedures for the generation of "data of sufficient quality." Although these guidance documents are written for use by EPA Superfund project managers they are adopted by federal agencies in completion of all of their programs to assure consistency and acceptability. Furthermore, EPA project managers use these guidance documents in their oversight of DOD led IRP programs. The reliance on CLP procedures for data quality may be excessive based on the ultimate use of the data in the decision process. There are more simplified methods available, such as use of field laboratory analyses, at considerably lower costs offering data of sufficient dependability for risk assessment purposes. An interesting note is that an RI/FS budget for an EPA led Superfund investigation does not include

CLP costs (EPA, 1990:26). Therefore, the high cost of CLP dependency by the EPA is not readily visible in a review of the clean-up program.

**EPA Data Quality Objectives**

As a guidance to the remedial project manager the US EPA has established a Data Quality Objectives (DQO) process to "help site managers decide what type, quality, and quantity of data will be sufficient for environmental decision making" (EPA, 1993a:4). The EPA, in its DQO guidance document, recognizes that one of the primary goals of the DQO process is to establish a balance between acceptable limits of decision errors and the cost of meeting those limits (EPA, 1993a:4). It is in this balance between necessary data quality/quantity and cost of acquiring such data that the overall costs of the IRP program can be evaluated and streamlining measures developed and implemented.

The EPA's Guidance for *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites* includes the following description of the various levels of data based on the DQOs:

> Level I is the lowest quality data but provides the fastest results. Field screening or analysis provides Level I data. It can be used for health and safety monitoring and preliminary screening of samples to identify those requiring confirmation sampling (Level IV). The generated data can indicate the presence or absence of certain constituents and is generally qualitative rather than quantitative. It is the least costly of the analytical options.
>
> Level II data are generated by field laboratory analysis using more sophisticated portable analytical instruments or a mobile laboratory on-site. This provides fast results and better-quality data than in Level I. The analyses can be used to direct a removal action in an area, reevaluate sampling locations, or direct installation of a monitoring well network.

Level III data may be obtained by a commercial laboratory with or without CLP procedures. The analyses do not usually use the validation or documentation procedures required of CLP Level IV analysis. The analyzed parameters are relevant to the design of the remedial action.

Level IV data are used for risk assessment, engineering design, and cost recovery documentation. All analyses are performed in a CLP analytical laboratory and follow CLP procedures. Level IV is characterized by rigorous QC protocols, documentation, and validation.

Level V data are those obtained by nonstandard analytical procedures. Method development or modification may be required for specific constituents or detection limits. (EPA, 1991a:2-38)

As can be seen by these data level definitions by the EPA, analytical data generated by a field lab (Level II data) is appropriate for use as a field decision tool but not for the more critical uses of remedial design and risk assessment. These definitions clearly state that Level IV data, that generated by CLP procedures, are necessary for risk assessment purposes. When conducting a site investigation (e.g., an RI/FS) the project management team would certainly wish to minimize any duplication of efforts and costs from collecting two separate types of data for two different decision uses. Therefore it would be shrewd to make maximum use of data generated by the most economical but accurate method. This could be done by not only utilizing the field generated data for on-site decisions regarding delineation of nature and extent of contamination but to also use the data in the risk assessment conducted for the site and in the remedial design of the selected clean-up alternative. The EPA identifies these as two clearly separate categories of data needs (EPA,

1990:23) and this paper pursues the possibility of generating economical data that is usable for both.

Although the above levels of data may be differentiated by different types of analytical equipment used, the primary variable amongst the levels is the extent of QA/QC. Therefore, the EPA desires data generated by CLP lab procedures specifically for the inherent QA/QC assurances. This study investigates the perceived need for the Level IV QA/QC for data used in risk assessments.

**Potential for Increased Reliance on Field Analyses**

As we have seen through the assessment of current EPA guidance and past practices by DOD facilities conducting IRP investigations the trend is to use field analytical techniques only for quick "in-the-field" decisions and rely on off-site or CLP lab techniques for generating the data used for risk assessment, remedial design, and other crucial decision processes. Despite the trends toward reliance on off-site generated data, and the suggestion to do so as established in certain EPA guidance, the EPA and others recognize that an increased reliance on field analytical data is possible. The EPA guidance *Data Quality Objectives Process for Superfund* states:

> It is important not to rule out any alternative analytical or field sampling methods due to preconceptions about whether or not the method is "good enough." Traditional lab methods tend to minimize measurement error, but they can be so expensive that only a limited number of samples can be analyzed within the budget. There may often be advantages to using less precise methods that are relatively inexpensive, thereby allowing a significantly larger number of samples to be taken. Such a design would trade off an increase in measurement error for a decrease in sampling error. (EPA, 1993a:39)

Although this philosophy does not help in the reduction in overall site costs due to the "decrease in quality for increase in quantity" attitude, it does recognize that other, less stringent, methods are acceptable. The EPA's *Guidance for Data Useability in Risk Assessment* document again recognizes this potential for trading off quality for quantity but also goes one step further by stating:

...field analysis or fixed labs [other than CLP] can produce data of acceptable quality at equal or lower cost than the CLP. Accordingly, RPMs and Risk Assessors should not use the CLP as a default option, but should seek the source of data that best meets the data quality needs of Risk Assessments. (EPA, 1990:3)

From a regulatory standpoint, the door is open for responsible parties at CERCLA sites to optimize the use of field generated data. Before this can be widely accepted there needs to be a resolution of certain issues. These issues include: resolution of necessary quality assurance at field labs; establishing a track record of experiences with field methods and comparisons with off-site lab data; resolving administrative problems from outmoded regulatory guidance and state reimbursement policies (Robbins, 1992:8).

**Field Analysis Versus CLP (or Off-site) Analysis**

When developing a sampling and analysis program for a CERCLA/IRP remedial investigation the tradeoffs among using on-site generated field analytical data versus reliance on off-site or CLP generated data must be evaluated (Table 3).

**TABLE 3**
TRADEOFFS BETWEEN USE OF FIELD AND FIXED LABORATORIES

| CHARACTERISTIC | FIELD ANALYSIS | FIXED LABORATORY ANALYSIS |
|---|---|---|
| Prevention of False Negatives | Immediate analysis means volatiles not lost due to shipment and storage. | More extensive sample preparation available to increase recovery of analytes. |
| Prevention of False Positives | No sample to sample contamination during shipment and storage. | Contamination by laboratory solvents minimized by storage away from analytical system. |
| Analytical Turnaround Time | Data available immediately or in up to 24-48 hours (additional time necessary for data review). | Data available in 7-35 days at non-CLP labs unless quick turnaround time requested (at increased cost). This time increases to 3-5 months with CLP data due to the extensive data validation process. |
| Sample Preparation | Limited ability to prepare samples prior to analysis. | Samples can be extracted or digested, thereby increasing the range of analyses available. |
| Cost of Acquisition | Cost is relatively low for individual organics analyses. (More samples may be collected for increased precision and accuracy.) | Cost is relatively high. (Individual analyses provide better precision and accuracy.) |

Source: (EPA 1990:46)

Although off-site analyses offer the most stringent quality control and quality assurance activities, there are associated drawbacks with reliance on off-site lab data for decision making purposes. Prof. Gary Robbins of the University of Connecticut identifies several of these in his paper titled "Application of Field Screening Methods for Expediting and Improving Underground Storage Tank (UST) Site Assessments" (Robbins, 1992:8). The reliance on off-site lab data can result in drawn out site assessments due to the length of time required for samples to be collected, shipped, analyzed and the analytical results received. This was seen at the Wright-Patterson Operable Unit 2 Remedial Investigation which scheduled three rounds of analyses, each of which having a turn around time for lab analytical results of approximately 4 months (Engineering-Science, 1992:25). The turnaround time for field generated data is measured in hours versus the typical time for CLP data of 3-5 months. The RI/FS is intended to be an iterative process with analytical results fed back into the ongoing design of field investigations. Therefore, the quicker availability of analytical results for inclusion in follow-on investigation design will lead to a more complete, accurate, and economical site study. Use of field labs for data generation can benefit this more rapid investigation feedback.

Another drawback of reliance on off-site analyses is the potential for the further exacerbation of site problems while awaiting analytical results. For example, while awaiting the lengthy return of data for making remedial action decisions, what was originally a fairly isolated plume of highly contaminated ground water may spread to a larger extent and potentially reaching drinking water supplies or other sources of direct exposure pathways. Or in a worse situation, a case of ongoing human exposure may be allowed to continue unnecessarily while awaiting data results identifying the dangerous exposure level.

There is also an inflexibility in the on-site selection of optimal sampling locations due to the lack of having expedited analytical results on hand. This can result in the oversight of critical contaminant pathways or exposure routes evaluated in the risk assessment for the site. By using a

field analytical process with rapid return of results, one can make decisions on-site as to follow-on sample locations to assist in the answering of questions with regard to contaminant transport directions or limits of harmful concentrations. This would maintain investigation momentum and avoid unnecessary demobilization and remobilization costs.

The final detriment with off-site analyses, one previously identified, is the inherent increased costs. Field results can be generated at less than half the cost of a sample analyzed via CLP protocol. Table 4 below compares the costs on a per sample basis of analytical work performed at Wright-Patterson AFB Operable Unit 5 which both used on-site and off-site CLP analyses.

**TABLE 4**
APPROXIMATE COSTS FOR FIELD AND CLP ANALYSIS
FOR VOLATILE ORGANICS

| | CLP Analyses | On-site Analyses |
|---|---|---|
| Analytical Cost[1] | $303.00 | $192.00 |
| Validation Cost[1] | 80.75 | ---- |
| Shipping Cost[2] | 18.75 | ---- |
| Total Cost | $402.50 | $192.00 |

1 Data from WPAFB OU5 actual costs
2 from Cressman, 1991:336

The disadvantages of field generated data, as recognized by the EPA in their guidance document for "Subsurface Characterization and Monitoring Techniques" (EPA, 1993b:10-1), include the following: QA/QC is much more difficult in the field; there is less sophisticated equipment and in combination with the more challenging QA/QC the detection limits are generally higher and precision and accuracy lower compared to CLP labs; and due to the previous two disadvantages the data would be more liable to challenge during future litigation. This study will show that field analyses can be completed with appropriate QA/QC to assure the resulting data are of sufficient quality and that the detection limits for field analyses are appropriate for the assessment of contamination levels of concern.

**Potential Error**

Within any portion of the CERCLA/IRP process there is the potential for error in the various decisions necessary. Assuming that the project manager responsible for the decision makes the appropriate decision intelligently and with all available data, the decision error is a result of total study error which consists of two parts: sampling error and measurement error. Sampling error results when the actual collection of samples in the field is unable to accurately capture the true state of the environment due to natural variability of contamination and the various media in which it exists (EPA, 1993a:30). The precise assessment of this type of error is impossible. Possibly the only way to minimize or control this type of error is to increase the number of sample locations to increase the probabilities of true representation of the environment. This would only result in increased costs, especially if off-site analyses are being used. The point of diminishing returns on the investment in an effort to lesson the potential error is reached much more slowly if there is a lower cost per analysis as would be with an on-site laboratory.

Measurement error results from the combination of insufficiencies in sample collection, sample handling, sample preparation, sample analysis, data reduction and data handling (EPA, 1993a:30). This type of error is easier to control by increasing QA/QC requirements, but in the case of CLP data generation there is a heightened potential for error due to the increased sample handling, data reduction and data handling. It is the responsibility of the site manager to balance the desire to minimize decision errors to acceptable levels with the costs associated with reducing such error. In other words, is the cost associated with limiting potential measurement error by using an off-site lab truly necessary or can field analyses be used to generate data of sufficient quality? The EPA states that one of the goals of the Data Quality Objectives process is to assist decision makers in the planning process to establish a balance between acceptable limits on decision error and the cost of meeting these decision error limits (EPA, 1993a:4). Furthermore, it recognizes that study error is not completely avoidable and in planning for an RI the remedial

project manager must assure that established uncertainty levels are acceptable, known and quantifiable, not that uncertainty be eliminated (EPA, 1990:4).

These two types of error can be further segregated into errors associated with systematic influences and those due to randomness in the environment and media. The random portion of error is that which is basically uncontrollable without simply increasing the number of samples collected and analyzed (Neptune, 1991). The systematic error is that associated with sampling and measurement bias and is more influenced by rigorous QA/QC procedures. Hence, this study is centered on systematic measurement error; that which is most influenced by the type of analytical equipment and procedures used.

When non-probabilistic sampling approaches are used, such as judgmental decisions by a project manager for sample locations, quantitative statements about data quality are limited to the measurement error component of total study error (EPA, 1993a:38). Due to various limitations to probabilistic sampling methodologies such as topographical or construction impedance, and the common involvement of professional judgment, these non-probabilistic sampling methods are typically employed. Therefore, it is the measurement error which is most controllable and on which this study concentrates in an effort to build a mechanism for reviewing data for quantitative quality assessments.

**Data Useability Criteria**

The U.S. EPA has published a guidance document for use in the completion of CERCLA clean-up activities entitled <u>Guidance for Data Useability in Risk Assessment</u>. The document defines *data useability* as "the process of assuring or determining that the quality of data generated meets the intended use" (EPA, 1990:iii). The process described in the document centers around six assessment criteria, some qualitative and some quantitative in nature, to determine whether a set of data is of sufficient quality for use in the quantitative risk assessment calculations of a remedial investigation. This study initially quantifies the six criteria to establish measurable standards.

These criteria are used to establish minimum levels of performance for field analytical data in the use of risk assessment. The application of these criteria is pertinent because of their completeness and due to the demand for data of highest QA/QC for use in the critical quantitative risk assessment. In other words, a test of sufficiency for use in a risk assessment is the most stringent evaluation to which environmental data can be subjected, and thus any data set meeting these criteria would be of sufficient quality for use in any other phase of the CERCLA process.

These six data useability criteria are composed of two aspects: sampling QA/QC and measurement (or analytical) QA/QC. Due to the efforts of this study to establish a verification mechanism for maximum utilization of field analytical data it concentrates on those portions of the criteria that impact upon the measurement QA/QC. As discussed earlier, this will only address a portion of the potential error associated with an environmental sampling and analysis program. The potential error associated with sampling is present regardless of the analytical method chosen and would be constant with either analysis choice. Sampling QA/QC (and sampling error) is maintained by strict adherence to good QC practices during the planning and execution of the sample collection process only and has no impact on, or impact from, the analytical methodology.

The six criteria for assessing analytical data useability (for risk assessment) are: reports to the risk assessor, documentation, data sources, analytical methods, data review, and data quality indicators. The structure of these criteria not only evaluates existing data for useability in risk assessments but also establishes a guide for planning of data collection to assure data of acceptable quality. An outline of the six criteria and their importance in the risk assessment process is found in Table 5. A brief description of each assessment criteria and identification of how each effects the analytical portion of the sampling and analysis program is offered below.

**TABLE 5**
**IMPACT OF DATA USEABILITY CRITERIA IN BASELINE RISK ASSESSMENT**

| DATA USEABILITY CRITERION | IMPORTANCE | ASSOCIATED ISSUES |
|---|---|---|
| Reports to the Risk Assessor | Data are more useful if reported in a format that provides readability as well as additional clarifying information. Sample quantitation limits, narrative, and qualifiers that are fully explained reduce the time and effort required in interpreting and using the analytical results. Limitations can be readily identified and documented in the risk assessment report. | Responsiveness to potentially critical issues. |
| Documentation | Deviations from the sampling and analysis plan (SAP) and standard operating procedures (SOPs) must be documented so that the risk assessor will be aware of limitations in the data. The risk assessor may need additional documentation, such as field records on weather conditions, physical parameters and site-specific geology. Field records will impact the useability of some data. Data usable for risk assessment must be identified with a specific location. | Legal defensibility of data. Accountability and reliability. |
| Data Sources | Data sources must be comparable if data are combined for quantitative use in risk assessment. Plans can be made in the RI for use of most appropriate data sources so that issues of data compatibility are not encountered. | Maximization of pre-existing data use for planning and site assessment. |
| Analytical Methods/Detection Limits | The method chosen must assay for the chemical of potential concern. The choice of method involves planning for a detection limit that will meet the concentration levels of concern. If the detection limit is not low enough to confirm the presence and amount of contamination, samples will have to be re-analyzed at a lower detection limit if possible. | Potential for false negatives. |
| Data Review | Use of preliminary data or partially reviewed data can conserve time and resources by allowing modification of the sampling plan while the RI is in process. Critical analytes and samples used for quantitative risk assessment require a full data review. Other analytes and samples may be of less concern. | Full data review can be lengthy.<br>Data review feeds information into completeness and comparability assessments. |
| **Data Quality Indicators** | | |
| Completeness | Completeness for critical samples must be 100%. Unforeseen problems during sample collection and analysis can affect data completeness. If a sample data set for risk assessment is not complete, more samples may have to be analyzed, affecting RI time and resource constraints. | Poor data quality or lost samples reduce data set and decrease confidence in supporting information. |

**TABLE 5 (Continued)**

| DATA USEABILITY CRITERION | IMPORTANCE | ASSOCIATED ISSUES |
|---|---|---|
| Comparability | The risk levels generated in the quantitative risk assessment will be questionable if incompatible data sets are used together. | Ability to combine analytical results acquired from various sources using different methods for samples taken over the period of investigation. |
| Representative-ness | Sample data must accurately reflect the site characteristics to effectively represent the site's risk to human health and the environment. | Potential for false negatives. Non homogeneity of sample. Potential for false positive. Potential for change in sample before analysis. |
| Precision | If the reported result is near the concentration of concern, it is necessary to be as precise as possible in order to minimize false negatives. | Confidence in distinction between site and background levels of contamination. Primary importance when action limit approaches detection limit. |
| Accuracy | Quantitative accuracy information is critical when results are reported near the level of concern. Contamination in the field, shipping or laboratory may skew the analytical results. Instruments that are not calibrated or tuned properly may also bias results. The use of data that is biased affects the interpretation of risk levels. | Confidence in distinction between site and background levels of contamination. As concentration of concern approaches the detection limit, the differentiation includes confidence in the determination of presence or absence of chemical of potential concern. |

Source: EPA, 1990:24-29

*Reports to risk assessor*, the first test in the data useability assessment, is the most basic of the criteria and is simple to control with some ordinary management practices. It simply states that data reports must be submitted to those using the data (e.g., Toxicologist or Risk Assessor) in a timely and complete manner to facilitate a quick and accurate assessment of the situation. Specific implications on the analytical process are that the data reports must be complete with the details of the analytical procedures followed and include additional information such as analytical method, detection limit, and results (EPA, 1990:31).

*Documentation*, the second phase of useability assessment, is also fairly straight forward with little strict implications on analytical procedures used. The intent is to assess the

completeness of the records generated from the analyses to establish a data trail for use later in the useability criteria assessment (EPA, 1990:27).

*Data sources* is the next phase of the useability assessment. This criteria simply assures the identification of data from all current and historical data sources and it's evaluation for inclusion in the risk assessment process. One minimum requirement pertaining to the generation of quality analytical data is that there must be at least one broad spectrum analysis from each medium and each potential exposure pathway (EPA, 1990:28).

*Analytical methods and detection limits,* the next useability assessment criteria, is more specific and quantitative in nature. In this criteria importance is placed upon having analytical detection limits sufficiently low enough to identify all chemicals of concern. The analytical minimum requirement is that the detection limit for the method used be no higher than 20% of the concentration of concern for a given chemical. This is due to the effort to decrease the potential for false positives or false negatives resulting from attempts to quantify chemical concentrations that are very near the detection limit (EPA, 1990:28).

The *data review* criteria requires that all data to be used in risk assessment calculations be sufficiently reviewed for potential analytical errors. Potentially identified analytical errors in this process are: excedences of sample holding times; laboratory contamination of samples; calculation errors; or transcription errors. This review needs to identify analytical errors because the lack of an adequate review increases the level of uncertainty associated with the risk assessment. The actual level of review to be conducted is variable, based on the requirement of the data user and thus the only minimum requirements associated with the analytical work is that it simply requires completion at some level (EPA, 1990:31). The level of review conducted is typically based on the preferences and desired level of confidence of the decision maker(s).

The *data quality indicators* (DQI's) criteria consist of five measurable devices. These final criteria are the most detailed, the most quantitative, and therefore the most critical in establishing standards for determining the useability of field analytical data. These are:

completeness, comparability, representativeness, precision and accuracy. *Completeness* consists of the number of data points for which there is an analytical result for each chemical of concern. Data review criteria determines whether a data point is usable or has failed the sample handling or measurement protocol. *Comparability* is a representation of the ability of the data user to combine analytical results from different sources with different methods, such as field and off-site generated data. *Representativeness* is the assurance of data analysis in a way to sufficiently reflect the established performance standards and to represent the sample that was sent to the lab for analysis. *Precision* is the measure of analytical error as represented by variation or standard deviation of a set of measurements (done using sample duplicates or multiple analyses of performance evaluation samples). Finally, *accuracy* is a measure of the closeness of a reported concentration to the true concentration of a contaminant in the environmental sample (EPA, 1990:28-30).

**Measures of Acceptability**

Many have recognized the potential use of field analytical data in nearly all aspects of CERCLA restoration programs. Robbins recognizes this in his 1992 paper and states that there are a number of issues requiring resolution before there is a broad acceptance of the use of field analytical techniques. He has identified the need for the resolution of field quality assurance, a history of successful experiences with the use of field methods and comparisons to lab data, and the resolution of various administrative problems arising from outdated regulatory guidance and state policies (Robbins, 1992:8). Although it is beyond the scope of this study to resolve the issue identified by Robbins regarding the regulatory administrative problems, the cause of this claim was discussed earlier in this document. This research will address the first two issues raised by Robbins by establishing minimum standards for the use of field analytical data based on the aforementioned useability criteria and use these standards to test the useability of field generated data from case study site(s) which generated data by both field analyses and CLP protocol.

## III. METHODOLOGY

### Establishment of Minimum Standards for Useability of Field Data Based on Risk Assessment Criteria

Data useability criteria will be established as standards for the evaluation of any data set via the following:

**Reports to Risk Assessor.** As stated earlier, this criteria is one basically of common sense and good administrative practices. The intent is to assure the timely presentation of all pertinent data necessary to conduct an evaluation of data acceptability. The minimum standard is that all analytical results be submitted in a legible format complete with analytical method used, results for each analyte and each sample, quantitation and detection limits, and results from all quality control samples (i.e., blanks, splits, duplicates, and spikes). These reports are typically preliminary reports, include much raw data, and are eventually supported by submittal of the documentation listed below. This standard requires a qualitative assessment of environmental data.

**Documentation.** This standard involves another qualitative criteria assessment and simply includes the assurance of accurate records of all available analytical results and their availability for future assessment. The four major types of documentation required to be generated during an RI are: Sampling and Analysis Plan (SAP), including a Quality Assurance Project Plan (QAPP); Standard Operating Procedures (SOPs); field and analytical records; and chain-of-custody records. Although full scale chain-of-custody records are a requirement for cost recovery issues, it is not a minimum requirement for risk assessment (EPA, 1990:27). Again, this standard requires a qualitative assessment of environmental data to assure that all necessary documentation is complete and accurate for use by the remedial decision maker.

**Data Sources.** The minimum requirement here from an analytical standpoint is that there be a broad spectrum analysis conducted on representative samples from each medium and each potential pathway. The purpose is to assure that potentially harmful contaminants, not originally

identified in the scoping process, are not overlooked during the field investigation. This criteria can be met with the independent off-site analyses of split samples sent to an off-site laboratory for confirmation purposes and expanded analyte search unavailable in the field. Even with a strong reliance on field generated data there must still be a minimum number of samples shipped to an off-site or CLP lab for verification purposes, which will enable the RI team to cover this requirement. These samples are splits intended to conduct a broader, more complete analysis of samples to assure various uncommon/unexpected contaminants are not being overlooked in the on-site analyses. They can also function as verification samples in support of the results seen in the on-site analyses. The necessary minimum number of verification analyses by off-site labs was determined by review of existing EPA guidance and other professional literature.

**Analytical Methods and Detection Limits.** This criteria stresses the importance of using an analytical method having a minimal capability of detecting any contaminant level at or above the levels of concern. In not meeting this standard, there would be a significant increase in the potential for false negatives in the results due to the inability to identify potential harmful levels of contamination. The EPA has established a minimum requirement for this criteria of using "routine methods" when analyzing for chemicals of potential concern (EPA, 1990:88). The EPA defines a routine method as one that "has been validated and published and contains information on minimum performance characteristics (EPA, 1990:105)." Routine methods are not necessary as long as the field analytical method utilized can meet the minimum criteria of a detection limit of 20% of the contaminant level of concern (EPA, 1990:76). The minimum standard in this study was developed by an evaluation of risk based minimum acceptable values for a given contaminant and applying the 20% criteria. For example, the risk based SDWA (Safe Drinking Water Act) standard for TCE in water is 5 ppb and thus the minimum acceptable standard for the field analytical techniques used would be for a detection limit of 1 ppb. This would be sufficiently protective by minimizing the potential for a false negative; identifying no contamination when in fact it may be present at levels in the potentially harmful range.

**Data Review.** Within the CLP process the very thorough and often lengthy data validation process easily meets the data review criteria. The EPA guidance document for conducting RI/FS's at CERCLA landfill sites recognizes that the useability assessment can be completed via statistical techniques versus formal data validation (EPA, 1991a:2-3). The procedures established here-in for the more quantitative evaluation criteria (e.g., DQI's) include such statistical analyses of QC data used to judge whether data are consistent by examination of their distribution. This enables the identification of outliers and those exceptional data points would be suspect and should be further verified.

**Data Quality Indicators.** The *completeness* of a field data set is measured as compared to the minimum standard set in the planning process. This study establishes a minimum standard based on typical completeness values for actual CLP data sets. The completeness for the field data is calculated using:

$$\text{Percent Completeness} = \frac{\text{acceptable samples}}{\text{total samples}} \times 100$$

and this value compared to the minimum acceptable standard previously established. Causes foı samples to be classified as unacceptable are invalid or unusable results due to failure of holding time minimums, lab contamination, or other analytical mishaps causing erroneous results.

The minimum standard to be established for *comparability* is a simple quantitative one. The requirement is that data from field analyses must offer similar contaminant quantification and detection limits, with the same units of measure in the reports, as does the off-site verification analyses. This can be very difficult due to the often differing procedures used in CLP and on-site labs, different sample sizes, and matrix interferences (especially with solids). On-site labs typically utilize only gas chromatograph technology. Although the GC results are typically backed-up or confirmed by GC/MS in the laboratory, they can have very low detection limits (as low as 0.2 ppb). CLP analysis involves gas chromatograph with mass spectroscopy followed by

intensive data validation which results in higher reportable quantification limits. Due to the lack of packaging and shipping requirements with on-site analysis, the sample size is not a limitation. Larger sample size can result in a more representative assessment of contaminant conditions by allowing for greater homogeneity. Matrix interferences can raise detection and quantification limits due to various impurities having a wide range of effects on certain contaminants and the ability to recover these contaminants from samples. This is especially a problem with soil matrices which can contain multiple solid compounds having absorbency effects on the organic compounds.

Minimum standards for the *representativeness* criteria would be of little concern with the use of field analyses. As with the completeness standards, these too are to be established in the planning process. They address sample holding times, sample preservation and the analysis of blanks to evaluate potential sample contamination during transportation and storage; all of which will be minimized by conducting the quick on-site field analyses and eliminate extensive sample handling and shipping associated with off-site analyses. Therefore this criteria is not a consideration in the assessment of the useability of field analyses.

The minimum standard for the *precision* criteria assessment is a strong factor in the analysis of field generated data as compared to off-site/CLP data. The minimum acceptable variance of the data was established based on compound specific standards as established in the CLP Statement of Work (SOW). If no specific standard exists for a given compound, an analysis of compound characteristics was used to determine structure relationships with a compound having a recommended standard, and that standard applied. Measurement was made by using duplicates in the field results to calculate the relative percent differences (RPD):

$$RPD = \frac{|R1 - R2|}{(R1 + R2)/2} x100$$

where: $R1$ = Results of analysis of duplicate sample one

$R2$ = Results of analysis of duplicate sample two

All RPD values for a data set are compiled and their distribution presented (graphically vial a histogram). The mean RPD can be calculated and the percentage of values within the standard presented graphically in the histogram and calculated.

The minimum standard for the *accuracy* measurement criteria was again established using the recommended standards of the CLP Statement-of-Work. Also, a similar procedure as that used for the precision measurement was used to develop standards for those compounds not recognized in the CLP SOW. This measurement criteria uses the measure of percent recovery of the true level of contamination in a sample by the formula:

$$\%\ \text{Recovery} = \frac{\text{Observed Concentration}}{\text{True Concentration}} x100$$

This evaluation recognizes that the measured or observed amount of contamination in an environmental sample is rarely a precise measurement of the actual concentration present. The measured amount is a percentage of that actually present. The challenge in this assessment process is knowing the true concentration; something that is impossible to determine unless a known amount of a particular contaminant is injected into the sample to be measured. Therefore, the environmental lab will use a modified version of the above equation to allow for the measurement of percent recovery:

$$\%\ \text{Recovery} = \frac{(\text{measured amount} - \text{amount in unspiked sample})}{\text{amount spiked}} x100$$

A spiked sample is the combination of the original environmental sample previously measured (amount in unspiked sample) and an injection of a known amount of contaminant of concern (amount spiked). Under this evaluation, the known amount of contaminant injected into the sample ("spike") is the "true" concentration and the amount measured in the sample minus that originally measured in the field sample (that naturally present) used as the observed concentration. Since not every sample is spiked and re-measured for percent recovery, these measurements are not a specific quantitative measure but only represent a measurement trend in the analytical operations (EPA,

1990:89). This method gives an assessment of the field performance in quantitation of a given contaminant concentration as compared to the more QA/QC stringent off-site analyses.

A histogram display presents the distribution of the percent recovery results with the window of acceptable range of recoveries superimposed. The histogram presentations of result distributions were accomplished in the Statistix software package. This graphically displays the performance of the lab with regard to accurate compound measurements.

### Application of Minimum Standards on Field Data

Once established, the minimum standards were tested on existing data sets from the Wright-Patterson AFB IRP. Remedial Investigation work at WPAFB was chosen due to the heavy reliance on CLP data for risk assessment calculations and the existence of field generated data. WPAFB has begun using a field lab to generate field data for making quick decisions on individual environmental boring locations but has not been able to receive regulatory approval to use the data for higher level decisions such as sampling program modifications or risk assessment calculations (and thus remedial action alternative decisions).

**Ground water.** The assessment of the established minimum standards for the useability of ground water field data first entailed the compilation of the ground water results from the field lab. An evaluation of the quality control sample results was conducted for each primary contaminant of concern to assess the data's ability to meet the minimum standards. The data was also structured statistically for each contaminant of concern to display distribution characteristics of the values. These statistics can then be compared to similar statistics from the equivalent CLP analytical results to comparatively assess the quality of the two methods on a macro level (i.e., via an analysis of the variances). Since ground water samples on the WPAFB projects were not truly split with half the sample sent for field analysis and the other for CLP analysis, the comparison was conducted by using the monitoring well results from the initial round of sampling compared to field analyses from depths equivalent to those of the screened intervals.

**Soils.** Soils were analyzed in the same manner as the ground water with one major difference; the split samples from the soils sampling more closely represent true splits since, in many sample locations, a portion of the sample was analyzed on-site while another portion was shipped for CLP analyses. Due to variations in sample size and soil sample heterogeneity of matrices there is some level of unavoidable concern as to the true representativeness of these "splits," but it is as close as can be accomplished when directly comparing the two methods.

**Cost Implications of Reliance on Field Generated Data**

The potentially realized cost savings associated with a maximum reliance upon field generated data are determined by comparing costs associated with 100% reliance on CLP data and 100% reliance on field developed data. The lowest cost scenario of 100% dependency on field generated data is unrealistic due to the necessary minimum CLP data requirements for purposes of verifying the field laboratory data and for full suite analyses not available in the field. Therefore a consideration is made for the minimum level of CLP data generation and a range of reasonable costs for the analytical portion of a remedial project presented. The potential rate of increasing cost differentials between CLP, field and optimal mix of data is graphically presented via a linear presentation of total costs versus increasing sample numbers. This is important to display the higher cost differentials associated with the sites of larger size or greater complexity requiring a larger number of samples for characterization or monitoring.

# IV. ANALYSIS AND FINDINGS

## Introduction

The following discussion will first establish a set of qualitative and quantitative standards, based on the EPA's Data Useability Criteria, for the assessment of the quality of an environmental analytical data base for use in a Risk Assessment. Since the EPA guidance documentation specifies very little as to detailed standards for the assessment criteria, the standards established here will draw on the various guidance recommendations (where they exist), the Contract Lab Statement of Work, and general statistical theory.

Secondly, these established standards are applied to an existing CLP data base acquired from an IRP remedial investigation project at Wright-Patterson AFB. This data set is used to conduct a chemical specific analysis of the quantitative standards for comparison to the results of the field lab analysis. The same statistical analyses of the quality assurance data as used for the field lab assessment in this study were also used on the CLP data.

Next, the established standards were applied to an existing field lab analytical data base to measure its applicability to risk assessment calculations. Specifically, this assessment is accomplished by use of the field generated data from Wright-Patterson AFB Operable Unit 2. The qualitative standards are first measured against the data base as a whole followed by a chemical specific evaluation of the quantitative standards.

Next, this study conducted a direct comparison of field results to CLP results from similar sample locations at Operable Unit 2 for assessment of the data comparability. The results are presented in tabular form and the implications of the findings discussed.

At the close of this section is a review of the potential cost and schedule impacts of maximum utilization of field generated data. This analysis shows a great opportunity for expedition of IRP field investigations and the tremendous cost savings available.

**Development of Useability Standards for Analytical Data Bases**

A complete review of all applicable EPA regulations and guidance documentation was conducted for indications of existing standards for determining the useability of data in CERCLA/IRP investigations. This research identified methods for the measurement of various quality assurance indicators but generally failed to specify standards for acceptance of data. These standards remain ambiguous in an effort to allow for flexibility in establishing specific goals for data quality based on the characteristics of the given site, requirements and goals of the project, or the personal preferences of the EPA Remedial Project Manager. Due to this lack of specific standards, the EPA and other lead agencies in CERCLA clean-ups have fallen back on a reliance on CLP generated data to assure consistency and reliability in data quality. Established below is a set of fixed quality assessment criteria to allow for the proof of useability of field generated data on a consistent basis.

Of the six data useability criteria defined in EPA guidance, several are qualitative in nature and are very subjective. The remainder are quantitative in nature, and it is with these criteria that this research will concentrate upon in establishing standards. Each of the criteria are reviewed below and the resulting standards defined. The end of this section includes a summary of the standards established here-in.

**Qualitative evaluation criteria.** These criteria consist of the following: Reports to Risk Assessor, Documentation, and Data Review. These are to be applied to the data set on a non-chemical specific basis. In other words, they are to be used as an overall assessment of the data useability. Due to their strongly subjective nature, these criteria will only receive a cursory review in this study and would typically be left to the decision maker's personal preferences and the specific needs of the site under study.

**Quantitative evaluation criteria.** The remaining criteria as established in the EPA's data useability guidance will be used to establish standards for data acceptance. These criteria consist of Data sources, Analytical Methods and Detection Limits, and the Data Quality Indicators

(Completeness, Comparability, Precision, and Accuracy). Note the absence of the data quality indicator Representativeness. This is because the items of holding times, sample preservation, and analysis of blanks are not of concern when conducting the analyses in the field.

**Data sources.** The requirement here is that there be a number of broad spectrum analyses conducted, typically at an off-site laboratory, to verify that additional contaminants of concern beyond VOC's are not being overlooked and to support the findings of the on-site lab. The EPA does not specify this number of off-site samples. Professional documentation supports the use of anywhere from 0-30 %, depending upon such variables as severity of contamination, types of contamination, and matrix constituents (Moody, 1992:12). EPA literature states that the minimum requirement for risk assessment purposes is that only one sample per medium exposure pathway (e.g., ground water, surface soils, etc.) be analyzed using a broad spectrum analytical technique (EPA, 1990:80). This study only addresses Volatile Organic Compounds within matrices of only water and soils, therefore the types of contaminants and matrix constituents are limited and relatively basic. Considering these factors, our standard for number of off-site analyses as a percentage of all analyses conducted under a study will be 10%. This offers a conservative amount of supporting verification analyses while maintaining control on the overall project costs. The 10% standard will be sufficient to identify any gross errors in the on-site analyses.

**Analytical Methods and Detection Limits.** The EPA Guidance for Data Useability in Risk Assessment identifies a minimum standard of a detection limit of 20% of the contaminant level of concern. This study further develops this standard by identifying the contaminant level of concern for water as the Safe Drinking Water Act standard for each volatile organic compound. For soils we use the Risk Based Concentrations as established by U.S. EPA Region III. These soil standards use a lifetime cancer risk of $10^{-6}$ under "standard" residential exposure scenarios to calculate recommended standards. A summary of the water and soils concentrations of concern and the corresponding minimum detection limits is listed in Tables 6 and

7 below. Detection limits achievable in the field analytical lab must be below these standards for each compound in each matrices.

**TABLE 6**
DETECTION LIMIT STANDARDS FOR SOILS

| | Risk Based Standard (ug/kg) | Detection Limit Std (ug/kg) |
|---|---|---|
| Benzene | 22,000 | 4,400 |
| Carbon Tetrachloride | 4,900 | 980 |
| Chloroform | 100,000 | 20,000 |
| Ethylbenzene | 7,800,000 | 1,560,000 |
| Tetrachloroethene (PCE) | 12,000 | 2,400 |
| Toluene | 16,000,000 | 3,200,000 |
| 1,1,1-Trichloroethane | 7,000,000 | 1,400,000 |
| Trichloroethene (TCE) | 58,000 | 11,600 |
| Xylene | 160,000,000 | 32,000,000 |

**TABLE 7**
DETECTION LIMIT STANDARDS FOR WATER

| | SDWA Standard (ug/L) | Detection Limit Std (ug/L) |
|---|---|---|
| Benzene | 5 | 1 |
| Carbon Tetrachloride | 5 | 1 |
| Chloroform | 5* | 1 |
| Ethylbenzene | 700 | 140 |
| Tetrachloroethene (PCE) | 5 | 1 |
| Toluene | 1000 | 200 |
| 1,1,1-Trichloroethane | 200 | 40 |
| Trichloroethene (TCE) | 5 | 1 |
| Xylene | 10000 | 2000 |

*SDWA MCL/MCLG for Chloroform is grouped into halogenated hydrocarbons standard; based on similar tap water risk based concentrations to that of TCE, PCE and Carb. Tet.

**DQI--Completeness.** The standard for completeness for typical CLP data at Wright-Patterson AFB projects is 95%. Regulatory agencies regularly approve this standard, it is easily met by CLP analyses, and will be used as the standard for assessing the completeness of on-site generated analytical data.

**DQI--Comparability.** The requirement for similar reported units of measure between data sets is typically easily met due to unit conversion capabilities. This can be assessed qualitatively. As for similar detection limits and quantitation limits, establishing a standard other that "they must be equal" is impossible and actually impractical. Just because one data set has a higher or lower level of detection than another is no reason to eliminate it from use in a risk assessment. The Analytical Methods and Detection Limits criteria are the basis for review and acceptance of the necessary level of detection. Furthermore, when conducting risk assessment calculations, as a conservative measure the detection limit values are used as a worse possible case scenario when a contaminant is listed as non-detect. A higher detection limit would only raise the estimated risk as a conservative measure. The standard established herein will not involve a strict assessment but will be a more qualitative comparison of data sets for an assessment of "reasonableness".

**DQI--Precision.** As stated previously, data precision is measured as a function of the Relative Percent Difference (RPD) between two measurements of the same sample or duplicates. Within any analytical quality assurance program several duplicate samples are run, and all matrix spike samples are run as duplicates. The EPA Statement-of-Work for the Contract Lab Program lists target RPD maximums for a few volatile organics. These are not specified as a requirement and are only a recommended limit within which to maintain the quality control of precision. The only volatile organic compounds under consideration in this study for which a target RPD is specified are trichloroethene (14%), benzene (11%), and toluene(13%). Therefore various key parameters effecting the recoverability of the nine contaminants of concern in an analytical procedure was compiled (Table 8) and an evaluation of similarities conducted to establish RPD standards for the additional contaminants. Table 9 contains the resulting complete set of RPD standards.

**TABLE 8**
**COMPARISON OF CONTAMINANTS OF CONCERN**

| CHEMICAL | MOL WT | DENSITY (g/cm3) | WATER SOLUBILITY (mg/L) | VAPOR PRESSURE (mm) | HENRY'S LAW (Pa M3/mol) | SORPTION PART.COEFF. | VOLATILIZATION (hours) |
|---|---|---|---|---|---|---|---|
| BENZENE | 78.11 | 0.8765 | 1780 | 76 | 576 | 1.92 | 2.7 |
| TOLUENE | 92.13 | 0.8669 | 515 | 22 | 677 | 2.49 | 2.9 |
| ETHYLBENZENE | 106.2 | 0.867 | 152 | 7 | 757 | 3.04 | 3.1 |
| O-XYLENE | 119.38 | 0.8802 | 175 | 5 | 534 | 1.68-1.83 | 3.2 |
| CHLOROFORM | 153.82 | 1.4832 | 8000 | 160 | 314.1 | 1.64 | 4 |
| CARB. TET. | 133.41 | 1.591 | 800 | 90 | 2912 | 2.642 | 3.7 |
| 1,1,1-TCA | 131.39 | 1.339 | 4400 | 100 | 1638 | 2.08 | 3.7 |
| TCE | 165 | 1.464 | 1100 | 60 | 1186 | 2.1 | 3.4 |
| PCE | 83 | 1.623 | 150 | 14 | 2718 | 2.38 | 4.2 |

Source: Mackay, 1993

The nine contaminants of concern can be broken into two chemical classifications; monoaromatic hydrocarbons and halogenated hydrocarbons. Benzene, toluene, ethylbenzene and xylene are all monoaromatic hydrocarbons. Chloroform, carbon tetrachloride, 1,1,1-TCA, TCE, and PCE are all halogenated hydrocarbons. A comparison of the densities, the volatilization values, and the Henry's Law coefficients (with the exception of Chloroform) for the individual compounds offers a clear distinction between the two classifications. Since TCE is the only halogenated hydrocarbon with an EPA CLP SOW suggested RPD limit, the same value will be

**TABLE 9**
**RPD STANDARDS**

| | RPD for Water | RPD for Soils |
|---|---|---|
| Benzene | 11 | 21 |
| Toluene | 13 | 21 |
| Ethylbenzene | 13 | 21 |
| Xylene | 13 | 21 |
| Chloroform | 14 | 24 |
| Carbon Tetrachloride | 14 | 24 |
| 1,1,1-TCA | 14 | 24 |
| TCE | 14 | 24 |
| PCE | 14 | 24 |

used for all other halogenated hydrocarbons (chloroform, carbon tet., 1,1,1-TCA and PCE). Due to the closer similarities of the vapor pressure and solubility values for ethylbenzene and xylene,

these compounds will retain the RPD value recommended in the CLP SOW for Toluene. Benzene has solubility and vapor pressure values significantly larger than any of the other three monoaromatic hydrocarbons.

Since the established RPD standards above are applicable to an individual sample result, there needs to be a percentile standard for maintaining the entire data set within QA parameters. This would represent the acceptable error in the RPD results. CERCLA/IRP decision making procedures commonly use an acceptable error of 10%. This would mean a standard of maintaining a percentile of 90% of RPD values within the contaminant RPD maximum value.

**DQI--Accuracy.** Accuracy is measured by the evaluation of matrix spike samples to determine the amount of known contaminant recovery. The CLP SOW again lists recommended ranges for the same contaminants as listed above for precision measurements (TCE, Benzene, and Toluene). The same procedure as used above for precision assessment was used for establishing criteria for all additional VOC's of concern. Since the percent recovery value can vary in either direction from an ideal value of 100%, these standards consist of a range of acceptable values both above and below the ideal criterion. The ranges established by the EPA in the CLP SOW are slightly biased toward error above the true values, but an evaluation of the method for determining the recommended range amount is not offered. Table 10 lists the resulting range for acceptable accuracy (percent recovery or %R) values for the given contaminants.

**TABLE 10**
% RECOVERY STANDARDS

| | %R Range for Water | %R Range for Soil |
|---|---|---|
| Benzene | 76-127 | 66-142 |
| Toluene | 76-125 | 59-139 |
| Ethylbenzene | 76-125 | 59-139 |
| Xylene | 76-125 | 59-139 |
| Chloroform | 71-120 | 62-137 |
| Carbon Tetrachloride | 71-120 | 62-137 |
| 1,1,1-TCA | 71-120 | 62-137 |
| TCE | 71-120 | 62-137 |
| PCE | 71-120 | 62-137 |

Note that the range for percent recovery in soils is much more forgiving than that for water. This is due to the greater tendency for matrix interferences in the soil samples than in the water samples. This same factor can influence the relative detection limits for water and soil analyses as will be seen later.

These standards are applicable only to the individual sample results and thus there needs to be a method of evaluating the entire data set towards meeting the standards. One does not want to use only a point estimate of data (e.g., the mean) to measure overall performance but needs to use an entire interval of plausible values (e.g., the set of QC data results). Since the optimal value for percent recovery is 100%, a total and exact measurement of the actual amount of contaminant present within a sample, a measure of the QA results in relation to a mean of 100% recovery must be employed. Assuming a normal distribution of results from assessment of accuracy via percent recovery, statistical evaluation of the mean reading to the optimal mean (100%) can be conducted. A means for conducting this evaluation involves the use of a t-test to compare the data base distribution to a preferred mean of 100%.

The t-test is a method of testing a hypothesis of a population mean and whether a set of sample data from this population of all possible values can be assumed to come from that population within a certain level of significance (Devore, 1991:286). In the case of the percent recovery measurements, the true mean of the population is 100%. This "assumption" will be the null hypothesis of our measurements. The alternative hypothesis in this study will be that the population mean, based on the set of measurements (samples), is not equal to 100%. Therefore, we can assume that the mean of the percent recovery quality assurance data is 100%, thus acceptable, unless our sample set of %R measurements strongly suggest otherwise. A failure of the t-test indicates this. T-test failure occurs when a calculated t-value from our data falls outside the critical t-values based on our level of significance (see below).

A variable to be used in these data quality assessments is that of the level of significance or the acceptable level of type I error (rejection of the null hypothesis when it is actually true).

This value is designated as $\alpha$. Typical values for $\alpha$ used in hypothesis testing range from .1 to .0005 which represent a level of significance of 90 to 99.95% (Devore, 1991:286). In the use of the t-test for assessing the accuracy of data we will use the most conservative value of 90% level of significance or an equivalent level of 10% acceptable error in our measurement. Our t-test is to be a two tailed test, due to a concern that our measured values are either significantly higher or lower than the true mean (100%), therefore our $\alpha$ value will be .05.

The calculation of a t-test also uses the variable $\nu$, or the degrees-of-freedom . This is equal to the number of data points in the set of measurements minus one (or n-1). The use of $\nu$ in the t-test calculations further enhances the use of a t-test in our accuracy assessment since as our data set increases, the t-critical value decreases. This would mean that with a larger data set the test becomes more stringent and thus the overall accuracy must improve over the duration of a field study.

T-critical values are read from a table of values based on the n and $\alpha$ values used. The test value from the set of percent recovery data is calculated by:

$$t = \frac{\bar{x} - \mu_0}{s / \sqrt{n}}$$

where: $x$ = mean of sample set of percent recoveries

$\mu_0$ = hypothetical mean (= 100%)

$s$ = standard deviation of sample set of percent recoveries

$n$ = number of values in sample set of percent recoveries

**Summary of Useability Standards.** Table 11 below summarizes the data useability standards used in assessment of environmental data sets for volatile organic compounds.

**TABLE 11**
SUMMARY OF USEABILITY STANDARDS

| CRITERIA | STANDARD |
|---|---|
| Data Sources | 10% off-site verification. |
| Analytical methods and Detection Limits | 20% of risk based standard for contaminant. |
| Completeness | 95% of all data usable. |
| Comparability | Same units of measure w/ other data sources. Similar detection limits. |
| Precision | 90% RPD values within standard for contaminant (Table #). |
| Accuracy | % recovery for contaminant pass two tailed t-test for $\mu_0$=100%. |

**Application of Standards to CLP Data Set**

The initial use of the standards established above was to apply them to a set of data generated at an off-site laboratory using CLP protocol in analyses and reporting. A lab using CLP methods also uses similar quality control procedures as those discussed above for use on field generated data, specifically; percent recoveries on spike samples and relative-percent-differences on duplicate analyses.

This analysis used summary results collected from a remedial investigation recently completed on Wright-Patterson AFB. The data is from Landfills 8 and 10 at WPAFB and was generated using off-site CLP procedures. The data base is very large, consisting of 78 spike sample results in soils samples and 102 spike sample results in water samples. There are also 39 spike duplicate samples for soils and 51 for water (for Relative Percent Difference assessment). The complete raw data set was not readily available as it is extremely voluminous and the contractor stores it off-site, and only summary results for the contaminants of concern were compiled within the final RI report documents. This data, though limited, gives a good indication of the CLP data useability as compared to the standards established herein.

The first quantitative standard to measure is that of data sources. This standard strictly applies to an on-site generated data set only since it involves the off-site verification of results.

Therefore, this standard does not apply to off-site or CLP generated data. It is important to note that where the on-site analyses would require the independent verification of results the CLP lab had no mechanism for independent verification to support the results. This could only weaken the validity of the off-site generated data.

The next criteria is that of analytical methods and detection limits. Since this data set was generated using CLP protocol, the methods used are obviously acceptable for risk assessment use. The CLP SOW requires organic analyses by the use of Gas Chromatography/Mass Spectroscopy or Gas Chromatography/Electron Capture methods (EPA, 1991b:A-4). The detection limits of the procedures used are listed below (Table 12) for soil and water samples. As can be seen, all detection limits for soils analysis easily meet the standards as established. Note the fluctuation in the detection limits due to soil matrix variability. The detection limits achieved for chloroform, carbon tetrachloride and benzene in water fail to meet the established standards.

**TABLE 12**
DETECTION LIMITS FOR CLP DATA SET
(soil in ug/kg and water in ug/L)

| Contaminant | Det. Limit-Soil | Std.-Soil | Det. Limit-Water | Std.-Water |
|---|---|---|---|---|
| Chloroform | 11-13 | 20,000 | 2 | 1 |
| 1,1,1-Trichloroethane | 11-13 | 1,400,000 | 2 | 40 |
| Carbon Tetrachloride | 11-13 | 980 | 3 | 1 |
| Trichloroethene | 11-13 | 11,600 | 1 | 1 |
| Benzene | 11-13 | 4,400 | 2 | 1 |
| Tetrachloroethene | 11-13 | 2,400 | 1 | 1 |
| Toluene | 11-13 | 3,200,000 | 1 | 200 |
| Ethylbenzene | 11-13 | 1,560,000 | 1 | 140 |
| Xylene | 11-13 | 32,000,000 | 1 | 2000 |

The next criteria is that of completeness. The CLP results from this project accomplished a completeness value of 100% for both soil and water results, easily exceeding the standard of 95%. This based on 11,496 usable soil data points of a total number of 11,550 points and 14,121

usable water data points of a total 14,139 points (a "data point" is a single record for a given contaminant in a given sample).

The assessment of the data's comparability is insignificant since identical standard-operating-procedures (CLP) at the same lab(s) generated all the data. Thus the detection limits (with the exception of the slight fluctuations in soils results) and the reportable units were consistent throughout the project.

With regard to the assessment for data precision, the relative percent differences (RPD) for this CLP data were broken into two separate categories: one for matrix spike duplicate analyses and one for the blind field duplicate analyses. The standard established above is meant for use on all duplicate analyses combined into a single data set, so here we will look at both separately due to the reliance on data summary reports. Table 13 presents the results of the matrix spike precision analysis. Note that the Landfills 8 and 10 documentation presents only those contaminants of concern for which the CLP SOW recommends standards. All the mean RPD values are clearly

**TABLE 13**
CLP MATRIX SPIKE DUPLICATE PRECISION ANALYSIS

Soil Results

| Contaminant | Mean RPD | QC Limit | SD | No. Points | % Within Limit |
|---|---|---|---|---|---|
| Trichloroethene | 7.0 | 24 | 6.7 | 39 | 97 |
| Benzene | 8.3 | 21 | 10.2 | 39 | 95 |
| Toluene | 8.8 | 21 | 9.2 | 39 | 95 |

Water Results

| Contaminant | Mean RPD | QC Limit | SD | No. Points | % Within Limit |
|---|---|---|---|---|---|
| Trichloroethene | 5.9 | 14 | 6.0 | 51 | 94 |
| Benzene | 6.1 | 11 | 6.4 | 51 | 86 |
| Toluene | 6.0 | 13 | 5.1 | 51 | 88 |

within the standards for each contaminant. The results for the soil precision analysis are all within the standard percentile of 90% of all values within the RPD limit. These are high percentiles for soil results and are likely due to the use of large concentrations of spike contaminants to minimize matrix and homogeneity effects of the soils. For the water analyses, those with more stringent

RPD limits, benzene and toluene were not within the percentile standard (86% and 88% respectively). The fact that both regulatory agencies overseeing the project (Ohio EPA and US EPA Region V) found these values to be acceptable indicates that the standards established within this document for assessing the useability of field generated data are very conservative or stringent.

The RPD results for the blind field duplicate analyses as presented in the RI documentation for Landfills 8 and 10 do not include values for percentage of results within the RPD limit. This is most likely due to the absence of RPD recommended standards for all VOC's of concern within the CLP SOW. Despite this absence, the results of the blind field duplicate RPD analyses as presented in Table 14 are very revealing. The mean RPD for toluene and xylene in soils clearly exceeds the established RPD limit, both also with considerably large standard deviations. This is a strong indication that a large percentage of the results are well beyond the

**TABLE 14**
BLIND FIELD DUPLICATE RPD RESULTS

Soil Results

| Contaminant | Mean RPD | Std Dev | QC Limit |
|---|---|---|---|
| Chloroform | 5.77 | 9.52 | 24 |
| 1,1,1-Trichloroethane | 5.43 | 8.64 | 24 |
| Carbon Tetrachloride | 5.77 | 9.52 | 24 |
| Trichloroethene | 6.05 | 9.71 | 24 |
| Benzene | 11.29 | 20.63 | 21 |
| Tetrachloroethene | 12.06 | 22.25 | 24 |
| Toluene | 24.98 | 36.18 | 21 |
| Ethylbenzene | 8.69 | 18.41 | 21 |
| Xylene | 24.88 | 41.95 | 21 |

Water Results

| Contaminant | Mean RPD | Std Dev | QC Limit |
|---|---|---|---|
| Chloroform | 4.21 | 27.28 | 14 |
| 1,1,1-Trichloroethane | 0 | 0 | 14 |
| Carbon Tetrachloride | 4.21 | 27.28 | 14 |
| Trichloroethene | 0 | 0 | 14 |
| Benzene | .54 | 3.42 | 11 |
| Tetrachloroethene | 4.21 | 27.28 | 14 |
| Toluene | 3.78 | 22.88 | 13 |
| Ethylbenzene | 4.45 | 27.27 | 13 |
| Xylene | .24 | 1.26 | 13 |

established 90% percentile standard for results within the limit, thus failing the test for data acceptability. The mean RPD for the water results here are easily all within the established limit but have standard deviations much greater than those seen for the matrix spike duplicates. The zero values for the mean RPD for 1,1,1-TCA and TCE are most likely due to the total absence of these compounds in any of the analyzed samples. This is also likely the cause for the very low values in the benzene and xylene results.

The percent recovery analysis of the CLP data accuracy is also limited to only those contaminants of concern having recommended limits in the CLP SOW; trichloroethene, benzene, and toluene. The t-test for assessment of the data useability based on percent recoveries in matrix spike samples was applied to this data and the results tabulated in Table 15. For the soils results, benzene displayed very good accuracy having a mean %R value extremely close to the true value of 100% and a t-test statistic value of .05 which easily passes the hypothesis test. Although trichloroethene displayed a mean %R value just slightly below the actual 100% mean, it barely

**TABLE 15**
**t-TEST FOR CLP ANALYSES IN SOILS**

| | Mean % Recovery | Standard Deviation | Number of Points | Test Statistic Value | t-Critical for $\alpha=.10$ |
|---|---|---|---|---|---|
| Trichloroethene | 97.1 | 12.9 | 78 | -1.99 | 1.66 |
| Benzene | 100.1 | 16.4 | 78 | 0.05 | 1.66 |
| Toluene | 112.8 | 23.8 | 78 | 4.75 | 1.66 |

**t-TEST FOR CLP ANALYSES IN WATER**

| | Mean % Recovery | Standard Deviation | Number of Points | Test Statistic Value | t-Critical for $\alpha=.10$ |
|---|---|---|---|---|---|
| Trichloroethene | 101.7 | 10.3 | 102 | 1.67 | 1.66 |
| Benzene | 104.9 | 10.9 | 102 | 4.54 | 1.66 |
| Toluene | 102.8 | 10.4 | 102 | 2.72 | 1.66 |

failed the t-test. Toluene was clearly biased high and easily failed the t-test. As for the water analyses, all three contaminants were close to the true mean of 100% but only trichloroethene passed the t-test.

In summary, the analysis of the CLP data set based on the above established standards resulted in a very poor evaluation. On the basis of this evaluation, this data would NOT be recommended for use in risk assessment calculations. The fact that regulating agencies found this data acceptable for its use in risk calculations emphasizes the conservative nature of the criteria and associated standards established herein, and that a truly strict adherence may not always be necessary.

**Application of Standards to Field Generated Data**

The previous section showed how an EPA accepted data set generated by an off-site laboratory using CLP protocol performed against the data useability standards established within this study. The results were well short of ideal. Now we will use the same criteria and standards to evaluate the useability of field generated data for risk assessment purposes.

The data set used for testing the standards is one recently generated at Wright-Patterson AFB Operable Unit 2. The remedial investigation at this operable unit used the field data as a screening tool for monitoring well screen placement and eventually for contaminant plume chasing, but not for risk assessment purposes (Engineering-Science, 1992:10-11). The field analysis lab used in this project followed U.S. EPA DQO Level II analytical protocols (Engineering-Science, 1992:1). For the risk assessment calculations, the project relied solely on data from an off-site CLP laboratory. The sites contained within Operable Unit 2 included the following:

-Burial Site 1; site of burial of approximately 4200 gallons of fuel tank sludge.

-Spill Site 2; spill of approx. 8300 gallons of JP-4.

-Spill Site 3; spill of approx. 1200-2500 gallons of fuel oil.

-Spill Site 10; spill of approx. 150 gallons of JP-4.

-Long-Term Coal Storage Area.

-Temporary Coal Storage Area.

-Coal & Chemical Storage Area.

-Building 89 Coal Storage Area

The resulting chemicals of concern are Volatile Organic Compounds and free product from the spill sites and the burial site and metals from the coal storage areas plus lead from the sludge burial site (Engineering-Science, 1992:4-6). Therefore, this area is a good test site for the assessment of the established data useability criteria.

**Data Sources.** The remedial investigation at Operable Unit 2 did not take full advantage of the use of field generated data. All data used in the risk assessment calculations were generated by CLP protocol at off-site lab(s). Therefore, a great proportion of the environmental data generated in this study was via CLP procedures, easily meeting the standard for data sources of having a minimum of 10% of all samples verified by off-site labs.

**Analytical Methods and Detection Limits--Soils.** A list of the detection limits for soil analyses achieved by the field lab at Operable Unit 2 as compared to the established standard detection limits is in Table 16. The detection limits achieved by the on-site field lab easily met the standards as established. Such low detection limits were achievable by the use in the field of a gas chromatograph without mass spectroscopy as is used in the conduct of CLP analyses. Any value falling below the detection limit is reported as the detection limit and it is these reported values used in the following assessments of precision and accuracy of the data.

**TABLE 16**
ANALYTICAL DETECTION LIMITS OF ON-SITE LAB FOR SOILS

| Contaminant | Standard D.L. (ppb) | On-site Lab D.L. (ppb) |
|---|---|---|
| Benzene | 4,400 | 1 |
| Toluene | 3,200,000 | 1 |
| Ethylbenzene | 1,560,000 | 1 |
| Xylene | 32,000,000 | 1 |
| Chloroform | 20,000 | .5 |
| 1,1,1-TCA | 1,400,000 | .5 |
| Carbon Tetrachloride | 980 | .5 |
| Trichloroethene | 11,600 | .5 |
| Tetrachloroethene | 2,400 | .5 |

**Analytical Methods and Detection Limits--Water.** Table 17 lists the detection limits achieved by the on-site lab for water (ground water and surface water) samples and how they compare to the established standards. The detection limits achieved by the on-site lab for water analyses were also well within the standards. As with the detection limits on the soils analyses, any contaminant not detected in the sample resulted in a reported value equal to the detection limit and these values are used in the analysis of precision and accuracy of the data.

**TABLE 17**
ANALYTICAL DETECTION LIMITS OF ON-SITE LAB FOR WATER

| Contaminant | Standard D.L. (ppb) | On-site Lab D.L. (ppb) |
|---|---|---|
| Benzene | 1 | .5 |
| Toluene | 200 | .5 |
| Ethylbenzene | 140 | .5 |
| Xylene | 2000 | .5 |
| Chloroform | 1 | .2 |
| 1,1,1-TCA | 40 | .2 |
| Carbon Tetrachloride | 1 | .2 |
| Trichloroethene | 1 | .2 |
| Tetrachloroethene | 1 | .2 |

**Completeness.** Without the complete laboratory raw data sheets and the field notes a thorough assessment of completeness is difficult to conduct. The completeness analysis is typically based on completion of the data review qualitative assessment; not conducted under this study. One potential source for analytical error effecting the completeness, the exceedence of sample holding time, would naturally be limited by the lack of a packaging and shipping requirement and very rapid turnaround of samples by the on-site lab. Transcription errors and calculation errors can not be identified in a cursory review of the compiled data sheets as were available for this study.

A cursory review of the compiled data set was conducted with attention paid to samples having missing data or analytical results of obviously erroneous values possibly resulting from lab contamination or equipment failure. This review could not identify all possible unusable data points.

The field generated data set reviewed from Operable Unit 2 included 2,709 possible data points from water analyses and 14,004 possible data points from soils analyses. Of the water sample results, six entire samples were rejected; four due to the lack of precise depth location information and two due to extremely high results possibly resulting from free product (fuels) interferences. This resulted in a calculated completeness for water data of 98.00%. Of the soil results only three data points of the 14,000 were rejected due to imprecise values recorded with a "number +" designation. The calculated completeness based on this review is 99.97%. Both of these are easily well above the standard of 95%.

**Comparability.** The units of measure for both the on-site generated data and the off-site CLP data are comparable at micrograms per gram for soils and micrograms per liter for water; both being equivalent to parts-per-billion (ppb).

The difficulty in assessing the comparability in the detection limits of each data set is with the reported quantities. With the on-site data, if no contaminant was observed in a particular sample, the reported value is the detection limit. With the off-site CLP analyses the quantitation limit is reported when no contaminant is detected. The quantitation limit is consistently higher than the detection limit. If detection of contamination in an off-site sample is below the quantitation limit, the reported value is equal to level measured; with some qualifiers. Detection limits, and more importantly the quantitation limits, are consistently higher for soils than for waters due to the adjustments on soils to allow for sample dilutions and moisture content (EPA, 1991b:B-33). As can be seen in Table 18, the off-site quantitation limits are considerably higher than the on-site detection limits, and even the off-site minimum detected levels are higher than the on-site detection limit. These minimum detected levels presented in Table 18 are only those values lower than or equal to the quantitation limits.

**TABLE 18**
**COMPARISON OF ON-SITE AND OFF-SITE**
**DETECTION AND QUANTITATION LIMITS (in ppb)**

| | DL Water On-Site Lab | QL Water Off-Site Lab | Min Detect Off-site Water | DL Soil On-Site Lab | QL Soil Off-Site Lab | Min Detect Off-site Soils |
|---|---|---|---|---|---|---|
| Benzene | 0.5 | 2.0 | 0.7 | 1.0 | 10-12 | 2.0 |
| Toluene | 0.5 | 1.0 | 0.6 | 1.0 | 10-12 | 2.0 |
| Ethylbenzene | 0.5 | 1.0 | 1.0 | 1.0 | 10-12 | 2.0 |
| Xylene | 0.5 | 1.0 | - | 1.0 | 10-12 | 2.0 |
| Chloroform | 0.2 | 2.0 | 0.6 | 0.5 | 10-12 | - |
| 1,1,1-TCA | 0.2 | 2.0 | 0.5 | 0.5 | 10-12 | 2.0 |
| Carbon Tet. | 0.2 | 3.0 | - | 0.5 | 10-12 | - |
| TCE | 0.2 | 1.0 | 0.9 | 0.5 | 10-12 | 2.0 |
| PCE | 0.2 | 1.0 | 0.6 | 0.5 | 10-12 | 2.0 |

**Precision--Water.** The following two data evaluation criteria, those of precision and accuracy, are most representative of the true nature of the data set due to the entirety of values available for concise measurement. Each contaminant of concern is evaluated separately to provide an understanding of the precision and accuracy measurement of each by the field laboratory. First we look at the precision of the field analyses on water samples. A similar assessment of precision on soil samples follows.

**Benzene.** The initial step in the precision assessment of a given contaminant was to calculate the Relative Percent Difference (RPD) values for each duplicate sample analysis. Appendix A contains the entire data set and calculated RPD values. The next step was to construct a histogram displaying the distribution of the results in relation to the established standard (Figure 1). The two important values for assessment of the RPD distribution and the precision in analysis of benzene is the mean RPD and the percentage of the values within the established standard (percentile). These values are displayed below. The "% Within Standard"

value determines whether the data for this contaminant passes the standard for precision (90%). The "Mean RPD" offers an indication of the overall strength of the analytical procedure in the

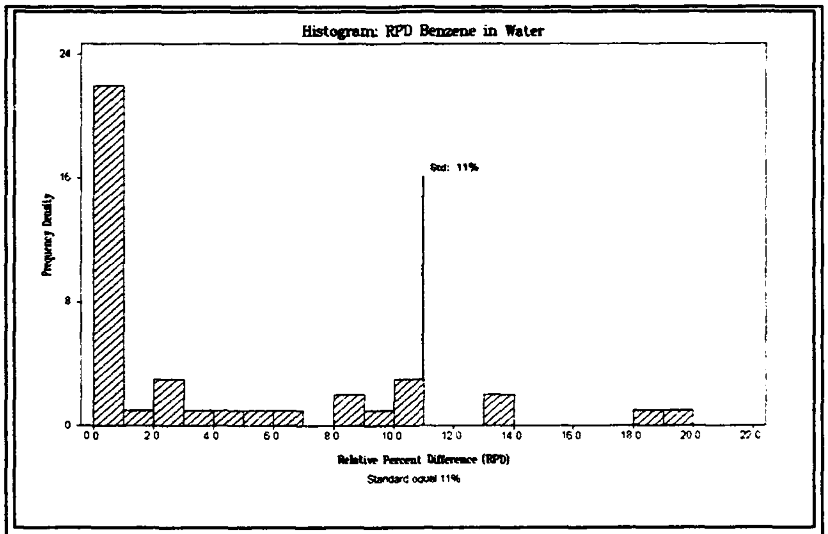



Fig. 1. Distribution of RPD Values for Benzene in Water

precision assessment. The lower the mean value (closer to zero or "perfect precision") the better the precision. The analyses of benzene by the field lab passes the test standard for precision with

| | Mean RPD | % W/in Standard |
|---|---|---|
| BENZENE | 3.81 | 90.00 |

90% of the samples within the standard of 11% RPD. The mean of 3.8% RPD indicates very little variation in the analysis of benzene concentrations.

**Toluene.** Figure 2 presents the distribution of RPD values for toluene and the resulting values are below. The mean RPD for toluene analysis is 5.22%, considerably

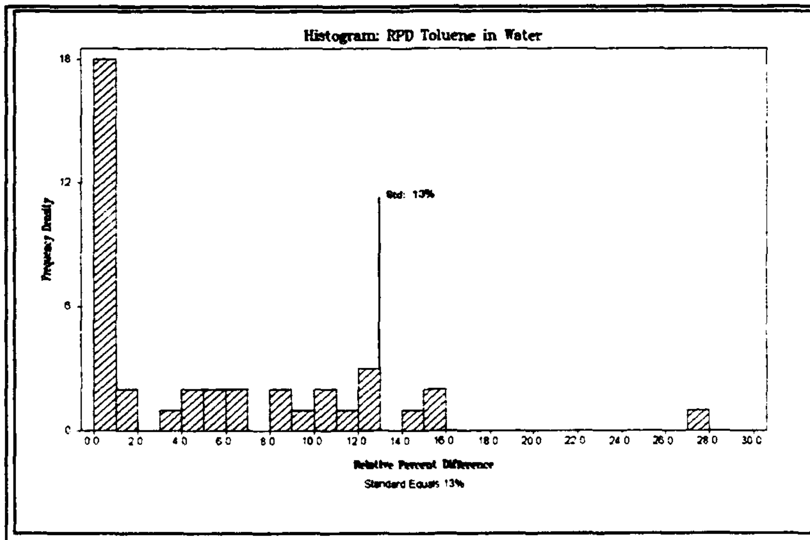



Fig. 2. distribution of RPD Values for Toluene in Water

below the standard of 13%. The percentage of values within the RPD limit is 90%, meeting the precision standard. Therefore the field analysis process maintained sufficient precision for the analysis of toluene in water.

| | Mean RPD | % W/in Standard |
|---|---|---|
| TOLUENE | 5.23 | 90.00 |

**Ethylbenzene.** Although the majority of the values for RPD of ethylbenzene are within the 0-1% (Figure 3), the data fails to pass the standard for precision with only 87.5% of the

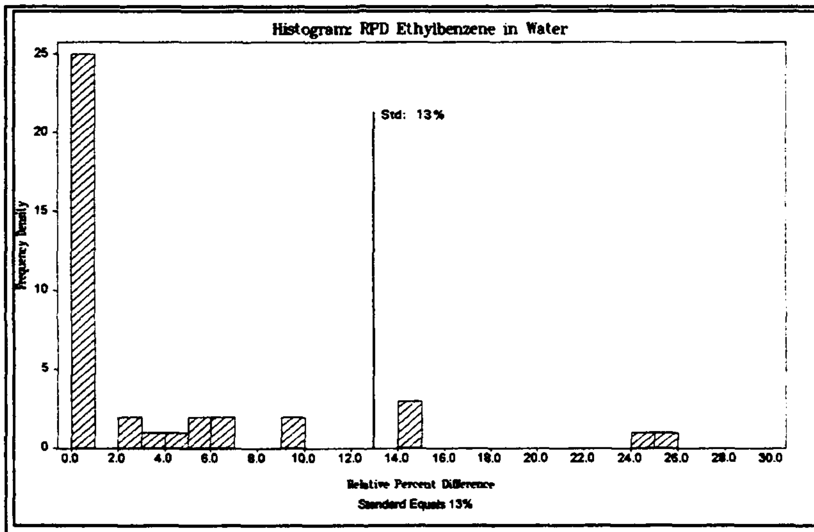



Fig. 3 Distribution of RPD Values for Ethylbenzene in Water

RPD values falling within the RPD maximum standard of 13%. The mean RPD of 3.73 indicates that the overall precision of the data set is fairly good and a review of the distribution of

| | Mean RPD | % W/in Standard |
|---|---|---|
| ETHYLBENZENE | 3.73 | 87.50 |

RPD values for ethylbenzene show that two values are only slightly outside the acceptable range. Although this data fails the precision standard, it is very close to being of acceptable quality. In comparison, the mean RPD for water analyses seen for CLP data earlier was higher at 4.45%.

**Xylene.** The precision analysis of xylene results from the field lab are not as good as the previous contaminants but is still promising. Figure 4 shows a distribution of RPD values

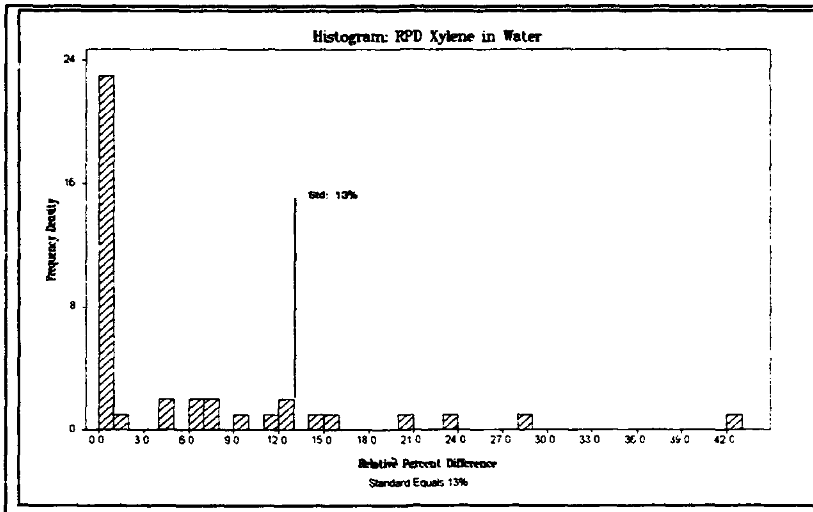



Fig. 4 Distribution of RPD Values for Xylene in Water

heavy in very low results but a fairly broad spread of outliers. The mean RPD is well within the maximum allowable RPD but the volume of results within the standard (85%) fails the 90% limitation.

| | Mean RPD | % W/in Standard |
|---|---|---|
| XYLENE | 5.80 | 85.00 |

**Chloroform.** Figure 5 contains the distribution of values for chloroform in water. Despite a pair of extreme outliers in the range of 80% RPD, there is a strong distribution in the lower

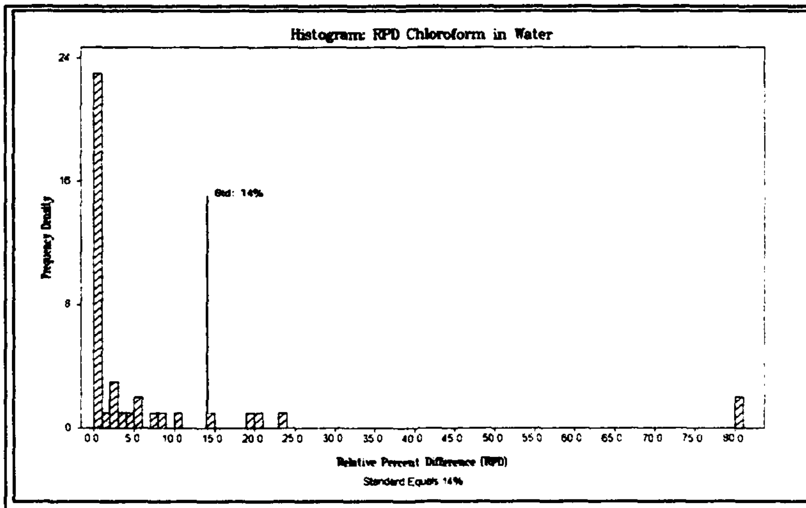



Fig. 5 Distribution of RPD Values for Chloroform in Water

ranges. These outliers have an effect on the mean RPD (7.35%) which is still well within the

| | Mean RPD | % W/in Standard |
|---|---|---|
| CHLOROFORM | 7.35 | 85.00 |

maximum allowable RPD. The same two outliers are preventing the data from passing the precision test of 90% within range, having a result of 85% within range which is still very strong.

**1,1,1-Trichloroethane.** As seen in the RPD results distribution in Figure 6, only five of forty values lie beyond the maximum RPD standard. Overall, the distribution is strongly below the standard as shown by the mean RPD of 4.27%. The precision assessment fails slightly with only 87.5% of the values within the standard.

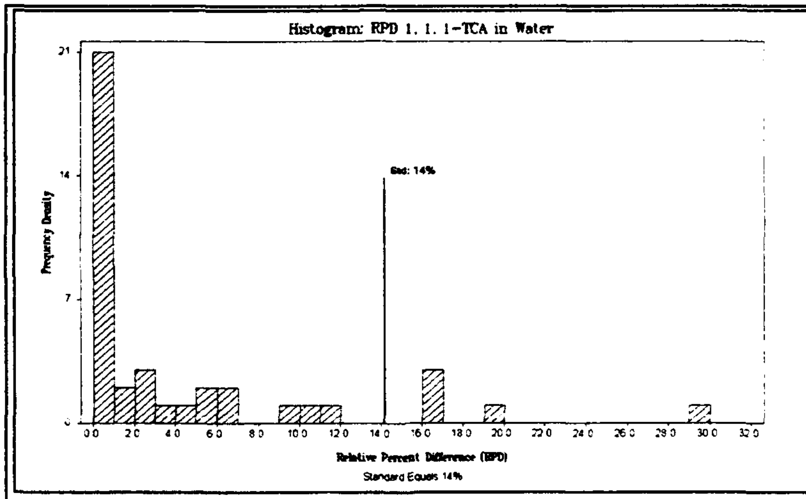


Fig. 6. Distribution of RPD Values for 1,1,1-TCA in Water

| | Mean RPD | % W/in Std. |
|---|---|---|
| 1,1,1-TRICHLOROETHANE | 4.27 | 87.5 |

**Carbon Tetrachloride.** The on-site analysis for carbon tetrachloride shows the best precision of all contaminants evaluated. The mean RPD is extremely low at 2.25 % and the percentage of values within the standard of 14% is a total of 97.5%. This is due to only one value (of forty) being beyond the standard.

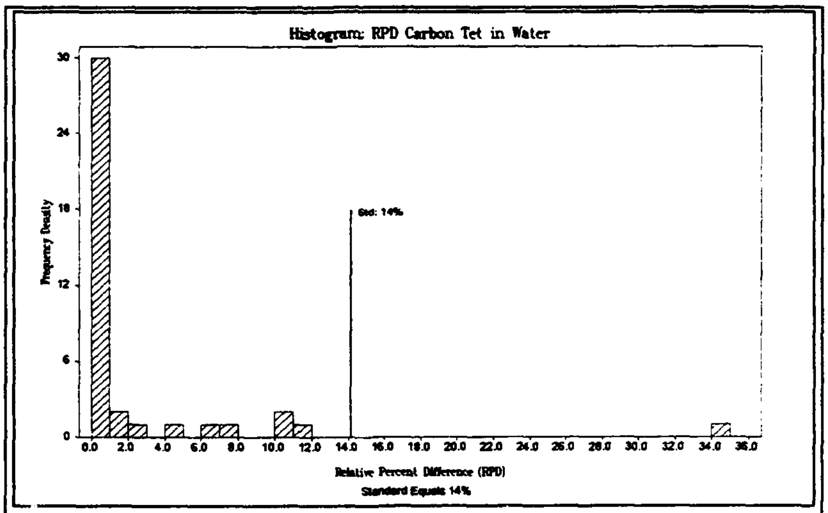


Fig. 7. Distribution of RPD Values for Carbon Tet. in Water

| | Mean RPD | % W/in Std. |
|---|---|---|
| CARBON TETRACHLORIDE | 2.25 | 97.5 |

**Trichloroethene.** The analysis of TCE is also very precise based on the assessment tools used herein. A total of 97.5% of the RPD values fall within the standard maximum RPD (only one

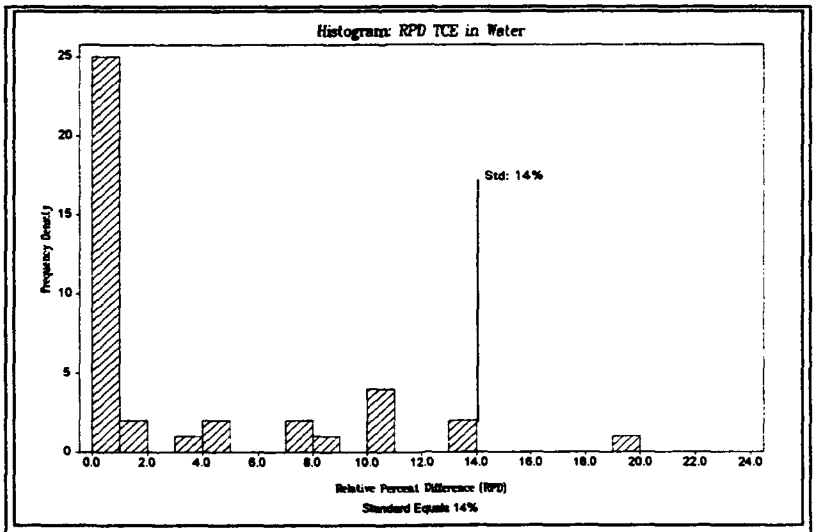


Fig. 8. Distribution of RPD Values for TCE in Water

| | Mean RPD | % W/in Std. |
|---|---|---|
| TRICHLORORETHENE | 3.17 | 97.5 |

outlier at 19% RPD) and the overall mean for all RPD values is a very low 3.17%. The individual

value falling beyond the standard is from the same sample having the only outlier for carbon tetrachloride. This is due to either improper handling of the sample by the lab or a matrix interference in this particular sample.

**Tetrachloroethene.** The precision analysis for PCE meets the standards as established with 90% of the RPD values being within the acceptable range and a relatively low mean RPD of 3.97%.

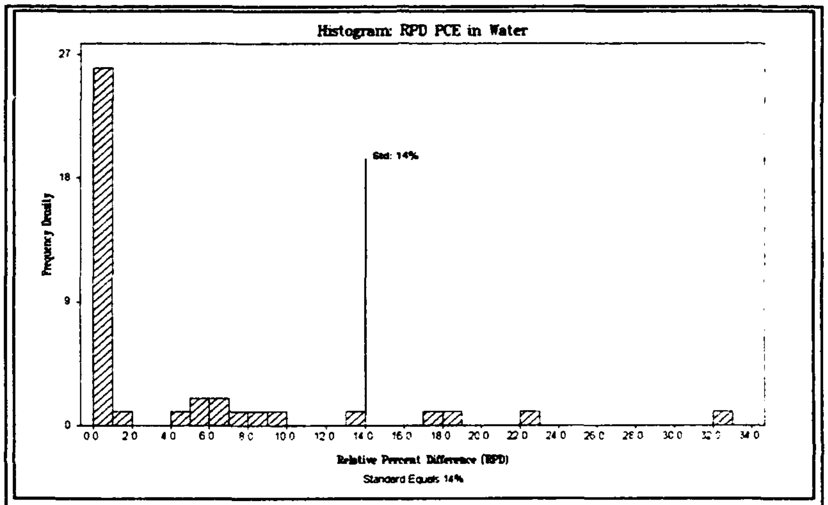



Fig. 9. Distribution of RPD Values for PCE in Water

| | Mean RPD | % W/in Std. |
|---|---|---|
| TETRACHLOROETHENE | 3.97 | 90.0 |

**Precision--Soils.** The results of the precision analysis for on-site measurements of VOC contaminants in soils are much more consistent than those seen in the analysis of water results. This is likely due to the greater number of soil sample results than for water; 207 cases versus 40 cases. Appendix B contains the complete data sets and calculations for the relative difference values for all contaminants. The mean RPD values for all contaminants of concern ranged from a low of 3.71% for chloroform to 7.88% for toluene. All mean RPD values are very good when considering the maximum RPD standards to be with 21 or 24% for a given contaminant.

The analysis of percentiles of RPD results within the standard maximum is also very consistent from contaminant to contaminant (see Table 19). The values ranged from 88% for xylene to 99% for chloroform. Only xylene and ethylbenzene failed to meet the standard of a minimum percentile of 90% within the maximum RPD value, but both were very close. These two

**TABLE 19**
**PRECISION ANALYSIS RESULTS--ON-SITE SOILS ANALYSES**

| | Mean RPD | Percentile W/in Standard |
|---|---|---|
| Benzene | 6.67 | 94.0 |
| Toluene | 7.88 | 90.0 |
| Ethylbenzene | 7.51 | 89.0 |
| Xylene | 7.59 | 88.0 |
| Chloroform | 3.71 | 99.0 |
| 1,1,1-Trichloroethane | 4.77 | 98.0 |
| Carbon Tetrachloride | 4.57 | 98.0 |
| Trichloroethene | 6.64 | 97.0 |
| Tetrachloroethene | 7.61 | 96.0 |

contaminants, and the two with resulting percentiles within the standard of 90% (benzene and toluene), are the four of the nine having the more stringent maximum allowable RPD of 21%. The remaining contaminants, those having a maximum standard of 24% had resulting percentiles which were much higher (96-99%).

Figures 10 and 11 below offer two examples of the distribution of results, which are representative of all contaminants. Note the greater spread in the distributions than those seen in the precision analysis of water results with some values reaching 100% and beyond. Figure 10 shows the distribution of RPD results for xylene, one of those that failed the percentile standard. Chloroform was the best of those contaminants exceeding the standard and is displayed in Figure 11.

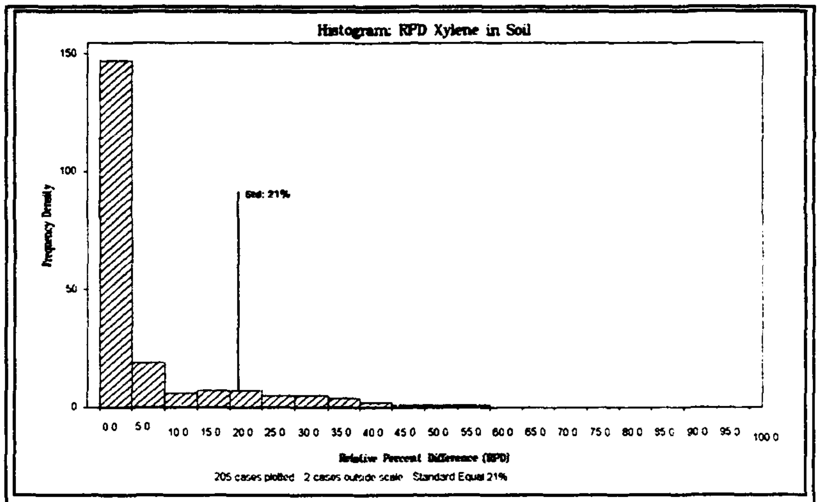


Fig. 10. Distribution of RPD Values for Xylene in Soils

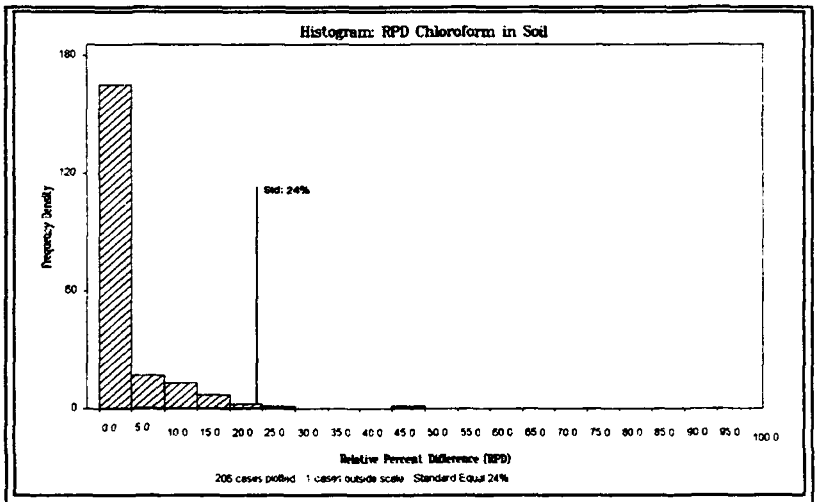


Fig. 11. Distribution of RPD Values for Chloroform in Soils

**Accuracy--Water.** As was done with the precision analysis of the field generated data, the accuracy analysis of the same data set was completed on a chemical specific basis. This allows for the individual evaluation of the performance of the field laboratory on the specific chemicals of concern to assess any variability in performance from one contaminant to another.

The initial step in the accuracy assessment for the chemicals in both water and soil samples was to compile the data according to chemical compound and calculate the percent

recovery for all available matrix spike analyses. Appendix C contains the complete results for water samples.

The two-tailed t-test was used to test the hypothesis that the mean of the sample set of percent recovery values was not significantly different from the true mean value of 100% recovery. Before application of the t-test, a test for data set normality had to be conducted to assure that the data was "near normal". This test for normality was accomplished by running the Wilk-Shapiro test on the data set which calculates a value ranging from zero to one; zero being no resemblance of normality and one being a perfectly normal distribution. A value of .80 or greater is needed for a data set to be deemed to have at least a near normal distribution (Reynolds, 1994).

Finally, the t-test was run for each contaminant having passed the test for normality. Microsoft Excel spreadsheets were used to run the t-test. The resulting t value is either negative, representing mean bias below the true mean of 100%, or positive, representing a mean bias above the true mean of 100%. Since we are running a two-tailed test, the t-critical value to which we compare the calculated t value to is either positive or negative and for the data to pass the test it must fall within the range represented by the positive and negative t-critical values.

All of the compounds passed the Wilk-Shapiro test for water analyses percent recovery with the exception of tetrachloroethene (PCE). Table 20 displays a summary of the resulting values and Appendix D contains the full results. The failure of the PCE data to pass the test for normality is due to two extreme outliers as can be seen on the distribution presentation in Figure 20.

**TABLE 20**
WILK-SHAPIRO NORMALITY TEST RESULTS
PERCENT RECOVERIES--WATER ANALYSES

| | Wilk-Shapiro Value |
|---|---|
| Benzene | .8502 |
| Toluene | .8319 |
| Ethylbenzene | .8647 |
| Xylene | .8706 |
| Chloroform | .8902 |
| 1,1,1-Trichloroethane | .8318 |
| Carbon Tetrachloride | .8540 |
| Trichloroethene | .8124 |
| Tetrachloroethene | .7410 |

A summary table of each contaminant of concern, the associated calculated t values for each set of percent recovery values, and the appropriate t-critical values for the number of observations is presented in Table 21 below. Following the summary table is a brief discussion of each contaminant data set, its distribution (w/ normal curve superimposed), and interpretation of the t-test results. (Note that scales for %R values in distributions vary.)

**TABLE 21**

T-TEST RESULTS FOR % RECOVERY IN WATER SAMPLES

| Contaminant | Mean % Recovery | t-Value | t-Critical | Pass/Fail |
|---|---|---|---|---|
| Benzene | 95.59 | -0.783 | ±1.721 | *Pass* |
| Toluene | 92.12 | -1.407 | ±1.721 | *Pass* |
| Ethylbenzene | 91.80 | -1.533 | ±1.721 | *Pass* |
| Xylene | 113.90 | 1.478 | ±1.721 | *Pass* |
| Chloroform | 79.36 | -4.862 | ±1.721 | *Fail* |
| 1,1,1-Trichloroethane | 73.61 | -6.501 | ±1.721 | *Fail* |
| Carbon Tetrachloride | 84.73 | -3.016 | ±1.721 | *Fail* |
| Trichloroethene | 78.00 | -4.834 | ±1.721 | *Fail* |
| Tetrachloroethene | 102.55 | 0.228 | ±1.721 | *Pass* |

**Benzene.** Figure 12 presents the distribution of the percent recovery results for benzene analysis in water by the field lab. As can be seen, there is a strong normal distribution centering around a 100% recovery value. This is realized in the results of the t-test which is passed easily and the mean of the values of 95.59%, slightly biased low but very near the ideal of 100%.

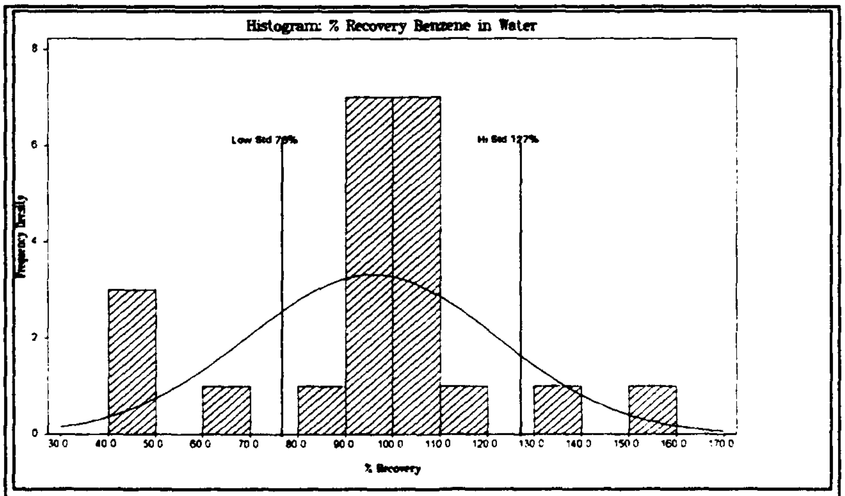



Fig. 12. Distribution of %R Values for Benzene in Water

**Toluene.** Figure 13 shows the distribution of toluene percent recovery results. The distribution is not as strongly normal as that seen for benzene, with a majority of the values

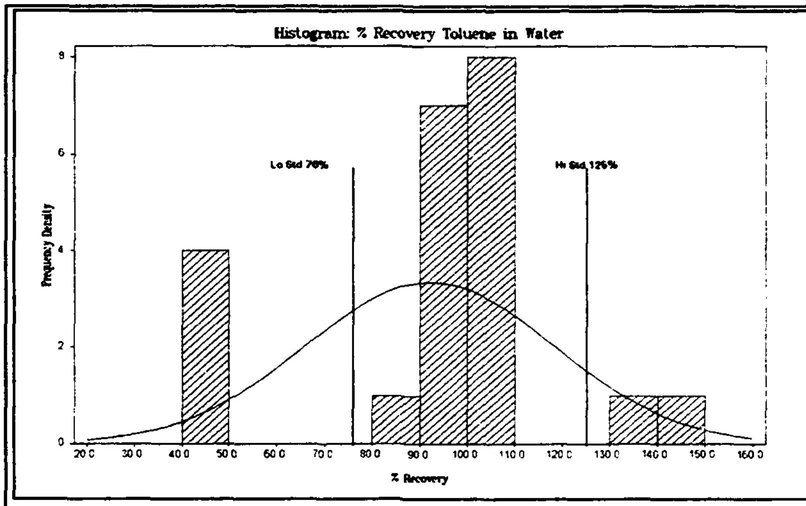



Fig. 13. distribution of %R Values For Toluene in Water

centered at the 100% expected mean and a few outliers on both sides. The bias is slightly low as seen in the mean percent recovery of 92.14% and a negative t-value. The t-test passes and therefore meets the established criteria for use in risk assessment.

**Ethylbenzene.** Figure 14 below includes the percent recovery distribution for ethylbenzene in water. A strong majority of the values are within the recommended minimum and maximum range of percent recoveries and the mean is slightly biased low at 91.8% recovery. The t-value is also negative but passes the test for being within the level of significance in relation to the true mean of 100%.

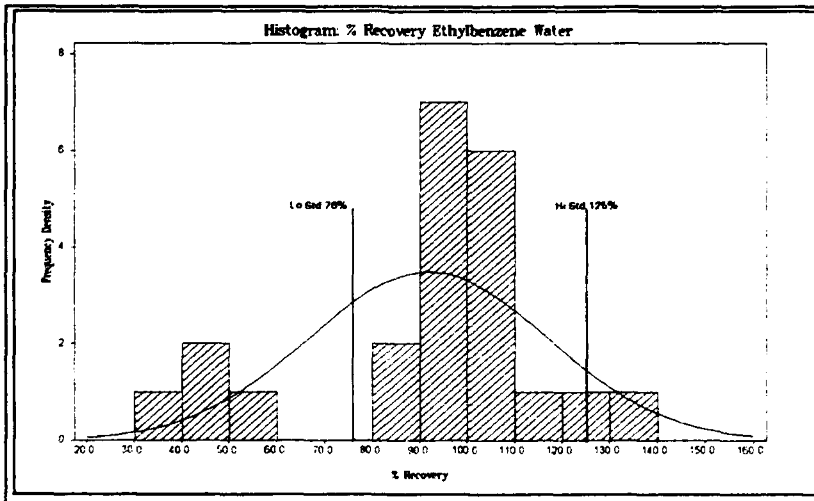



Fig. 14. distribution of %R Values for Ethylbenzene in Water

**Xylene.** The measurement of xylene in water samples by the on-site field lab also passes the test standard for accuracy. Figure 15 presents the distribution of results. The percent recovery distribution for xylene differs from the first three contaminants observed in that there is a stronger bias of outliers on the high end; in fact considerably higher than seen previously (up to

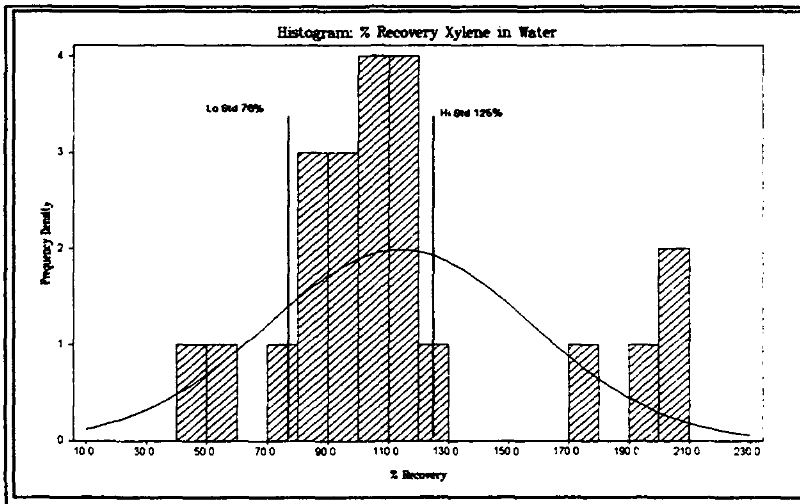



Fig. 15. Distribution of %R Values for Xylene in Water

nearly 210%). The reason for the several higher %R values in the xylene analysis is not easily identified but may be a result of the very low water solubility combined with the relatively low vapor pressure for xylene (Table 9). This could also be a result of peak interferences on the gas chromatograph output charts making delineation of xylene from another nearby compound difficult. This results in a mean percent recovery also biased high at 113.9% and a positive t-test value. The data still passes the t-test which justifies its use in risk assessment calculations.

**Chloroform.** As seen in Figure 16, the distribution of percent recovery for chloroform in water, the majority of the recovery values are below the 100% value. This results in a strongly biased low mean percent recovery of 79.36% and a failure of the t-test with a t-value of -4.86 as compared to a t-critical value of 1.72. This would recommend a failure in the accuracy measurement of chloroform in water by the field lab and thus not suggested for use in risk

assessment. The failure is despite the fact that a majority of the values falling within the range of minimum and maximum allowable recoveries. This is further proof of the stringency of the acceptance criteria and standards established herein.

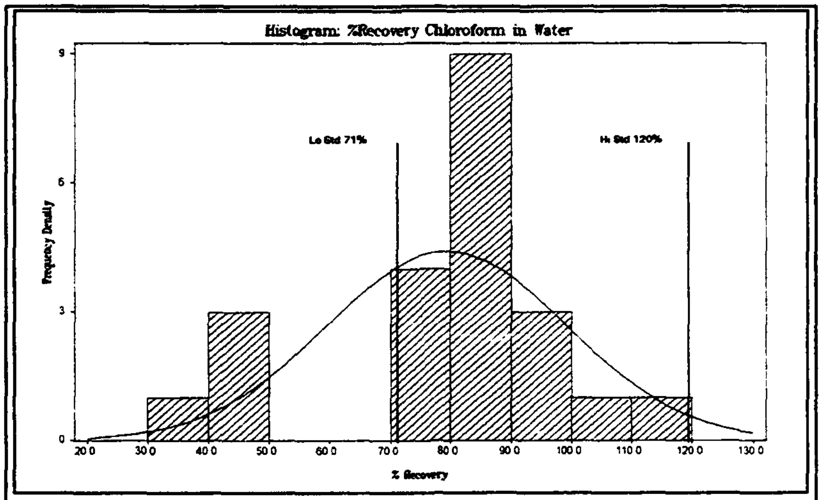



Fig. 16. Distribution of %R Values for Chloroform in Water

**1,1,1-Trichloroethane.** As with the results seen with chloroform above, the percent recovery results for 1,1,1-TCA are also biased relatively low as seen in Figure 17. The percent recovery mean value of 73.61% and a strongly negative t-value of -6.50, which easily fails the t-test, displays this bias. Therefore, this data is not recommended for use in risk calculations.

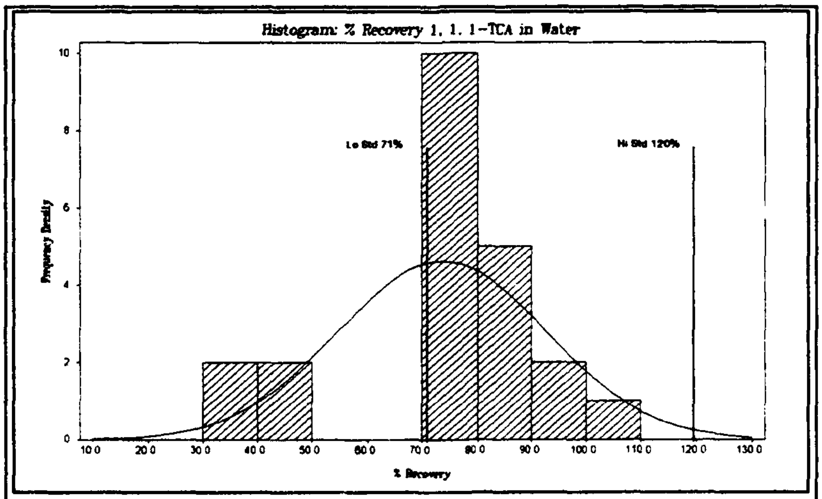



Fig. 17. Distribution of %R Values for 1,1,1-TCA in Water

**Carbon Tetrachloride.** Carbon Tetrachloride percent recovery results also fail the t-test for accuracy. Again, a low bias causes this failure as seen in Figure 18 below. Even though a majority of the results fall within the range of acceptance, the t-value of -3.02 fails the t-test due to a strong tendency for the values below the ideal mean of 100%, as seen by the mean percent recovery for Carbon Tetrachloride of 84.73%.

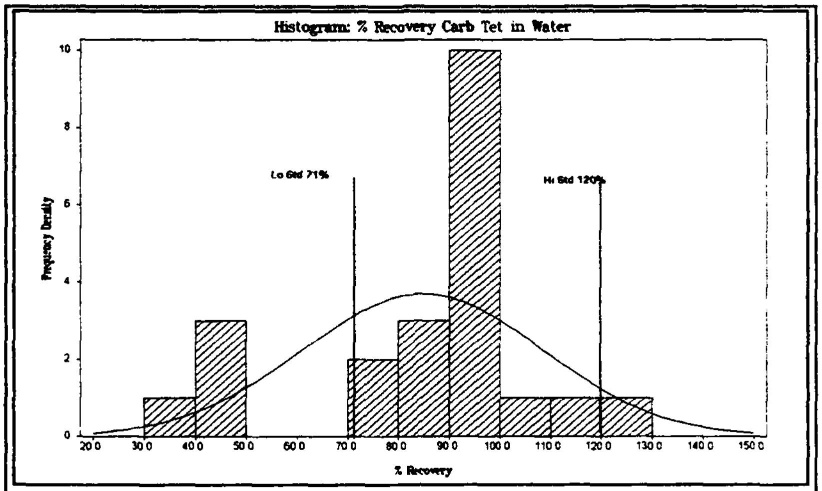



Fig. 18. Distribution of %R Values for Carbon Tet. in Water

**Trichloroethene.** The results of the accuracy analysis of TCE in water samples are very similar to that seen in the analysis of carbon tetrachloride and 1,1,1-TCA. TCE also has a biased low mean percent recovery of 78.0% and a strongly negative t-value of -4.834 which fails the t-test for data accuracy. Thus, it is not recommended that this data be used for risk calculations from TCE. This is unfortunate since TCE was one of the primary contaminants of concern for the investigation which generated this data set.

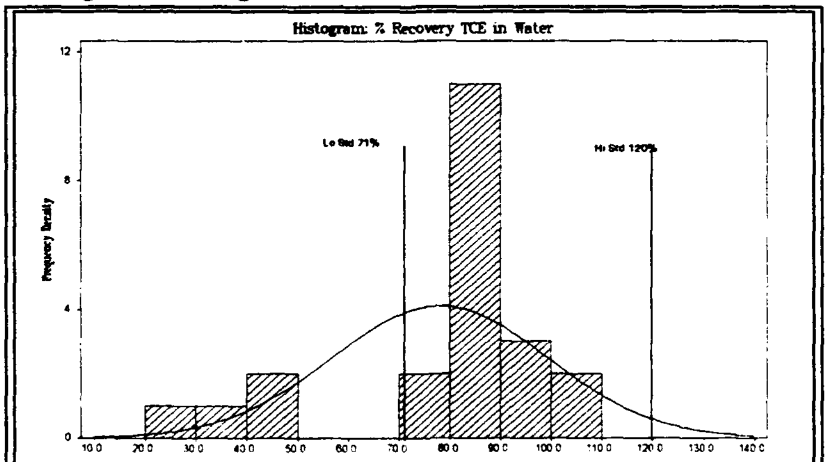



Fig. 19. Distribution of %R Values for TCE in Water

**Tetrachloroethene.** We will recall that the data set for percent recoveries of PCE in water failed the test for normal distribution. As seen in Figure 20 below, the data is fairly strongly normal with the exception of two extremely high values. These values, 256% and 236%,

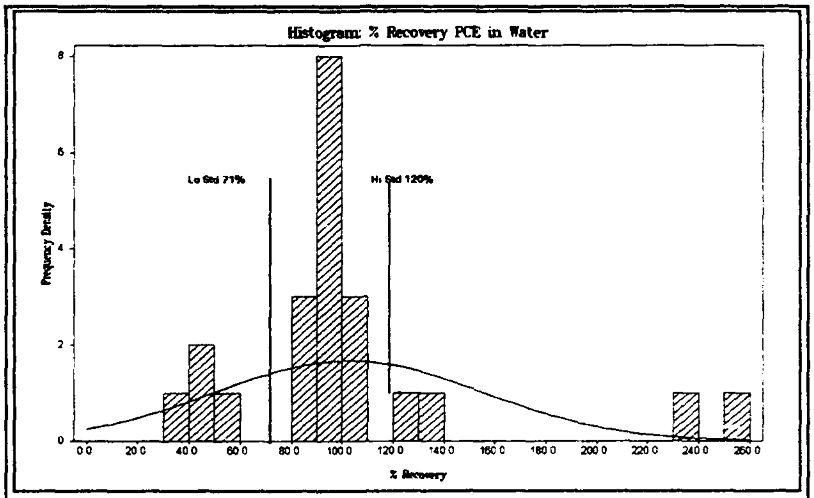


Fig. 20. Distribution of %R Values for PCE in Water

are much higher than any seen in the data sets from other contaminants. As was seen in the assessment of xylene percent recovery values, these high values may be the result of gas chromatograph column interferences from another volatile compound. With the inclusion of these data points the mean percent recovery for PCE is 102.55 which easily passes the t-test with a very low t-value of .228. By excluding these two points and recalculating the t-test, the data fails the evaluation standard for accuracy with a t-value of -2.09 and a mean percent recovery value of 88.2. On the basis of this assessment, it is not recommended that this data be used for risk calculations due to its displayed lack of accuracy.

**Accuracy--Soils.** The accuracy analysis of the soils data from the field lab was conducted the same way as that on the water data. Appendix E contains the data analysis sheets and complete percent recovery results. With the soils we are dealing with a much larger data set; a total of 124 matrix spike and matrix spike duplicate samples. This has some obvious effects on the data and there are other differences that are not so easily explained.

The initial step once again was to run the data set for each contaminant through the Wilk-Shapiro test for normality to assure the validity of the t-test. All contaminants showed a very strong normality, much stronger than that seen with the water data. This is due to the greater number of data points in the soils data sets. Below is a tabulation of the Wilk-Shapiro results (Table 22) and Appendix F contains the complete graphical results.

**TABLE 22**
WILK-SHAPIRO NORMALITY TEST RESULTS
PERCENT RECOVERIES--SOIL ANALYSES

| | Wilk-Shapiro Value |
|---|---|
| Benzene | .9695 |
| Toluene | .9762 |
| Ethylbenzene | .9819 |
| Xylene | .9455 |
| Chloroform | .9483 |
| 1,1,1-Trichloroethane | .9313 |
| Carbon Tetrachloride | .9298 |
| Trichloroethene | .9478 |
| Tetrachloroethene | .9606 |

Despite the clear passage of each data set in the test for normality, the distribution plots for the contaminant results in soil reveal a wide dispersal of values. Figures 21 and 22 below offer two examples. These are representative of the resulting distributions for all contaminants of concern. Note the wide range of values from near zero percent recovery to over 400 percent recovery of a given contaminant in soil samples. The bias of the data in each set is clearly on the high side, as seen by the mean percent recovery values of well over 100% and the high positive t-values (Table 23).

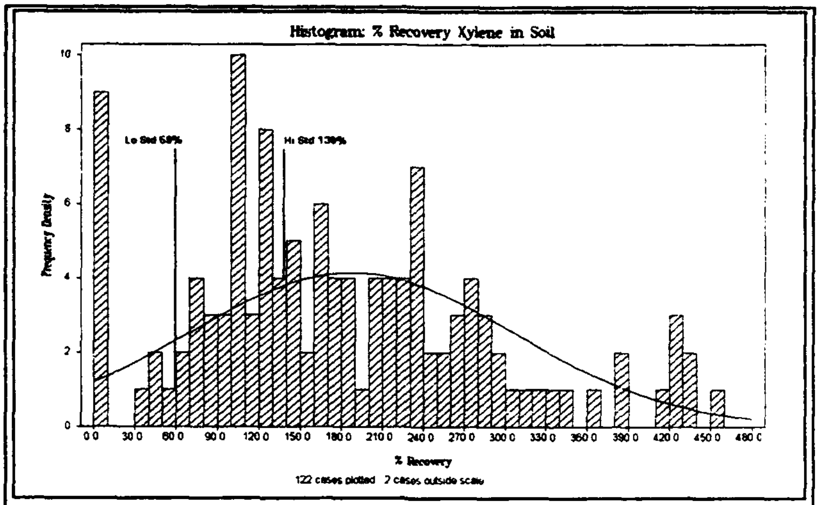



Fig. 21. Distribution of %R Values for Xylene in Soil

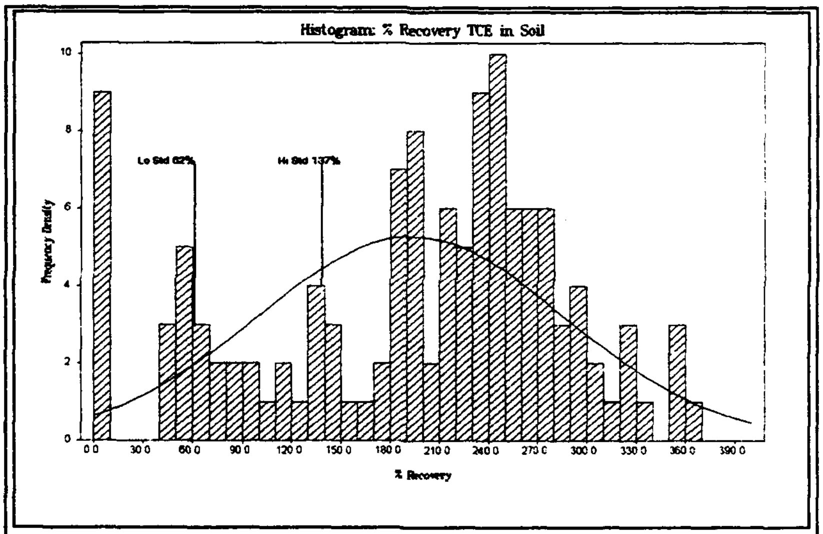



Fig. 22. Distribution of %R Values for TCE in Soil

All of the contaminant data sets failed the t-test for accuracy due to the wide distributions and high biased nature. Even though the data results in a consistently high bias on the contaminant recovery, a review of the data in comparison to CLP data results (see Appendix G) shows that this applied only to those samples actually containing contamination and there were very few false readings of contaminant when it was not present. These high false positive errors represent a conservative measurement mechanism but it's important to recognize that these inaccurately high readings can lead to unnecessary costs in remediation of a CERCLA site by over-reacting.

TABLE 23
t-TEST RESULTS FOR % RECOVERY IN SOIL SAMPLES

| Contaminant | Mean % Recovery | t-Value | t-Critical | Pass/Fail |
|---|---|---|---|---|
| Benzene | 190.64 | 10.271 | ±1.657 | *Fail* |
| Toluene | 170.71 | 8.608 | ±1.657 | *Fail* |
| Ethylbenzene | 167.77 | 7.898 | ±1.657 | *Fail* |
| Xylene | 187.95 | 8.192 | ±1.657 | *Fail* |
| Chloroform | 184.232 | 10.420 | ±1.657 | *Fail* |
| 1,1,1-Trichloroethane | 168.05 | 9.192 | ±1.657 | *Fail* |
| Carbon Tetrachloride | 146.84 | 7.170 | ±1.657 | *Fail* |
| Trichloroethene | 192.84 | 11.023 | ±1.657 | *Fail* |
| Tetrachloroethene | 145.49 | 6.840 | ±1.657 | *Fail* |

There were obviously some difficulties in analyzing the soil samples and getting an accurate reading of the true concentration of contamination present. Some of the effects were likely due to matrix interferences which is a common occurrence when trying to remove and measure organics from a matrix such as soil with its extreme inhomogeneities. The consistently high bias on the data set overall leads one to believe that the sample handling, measurement or lab operations had some strong influence on the results. To test this idea, the data for soils percent recoveries was compiled and sorted according to dates on which the samples were analyzed. This presentation, as seen for benzene and toluene below in Figures 23 and 24, reveals some interesting trends in the results. The two contaminants presented below are representative of the trends seen with all contaminants observed. There are clear trends in the bias of the data with progression through the project. At the outset of the investigation and utilization of the on-site lab the percent recovery results were consistently extremely low; near 0% recovery. As the project progressed, the recoveries increased to a point where they remain consistent just below the lower standard (66% for benzene and 59% for toluene) prior to increasing dramatically to consistent readings well above the upper standard of 142% and 139% respectively. The recoveries remain with a high bias for a majority of the investigation until a point near the end of the project where

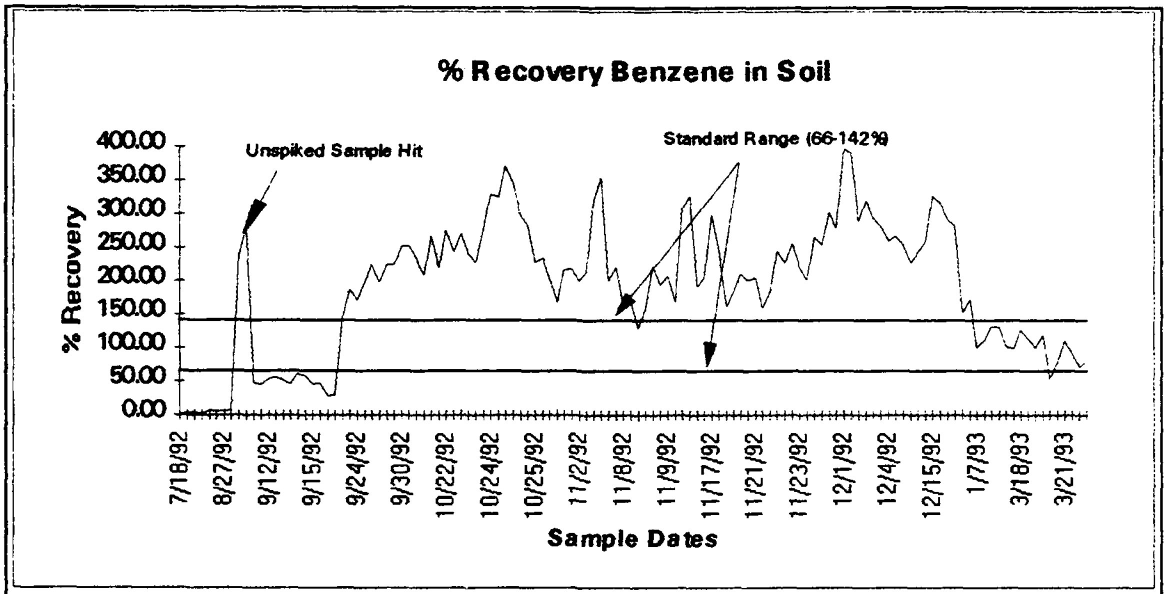



Fig. 23. Chronological Presentation of %R Values for Benzene in Soil

the recoveries began to trend consistently within the standard range of percent recoveries. A logical explanation of this change in trends during the duration of the project could be the use of different personnel in the operation of the on-site lab equipment, impressing their own biases on how the samples are run and the raw data analyzed and presented. Since similar recovery biases were not observed with the water analyses, the trends in the soils are likely due to sample extraction procedures used with the soil matrices.

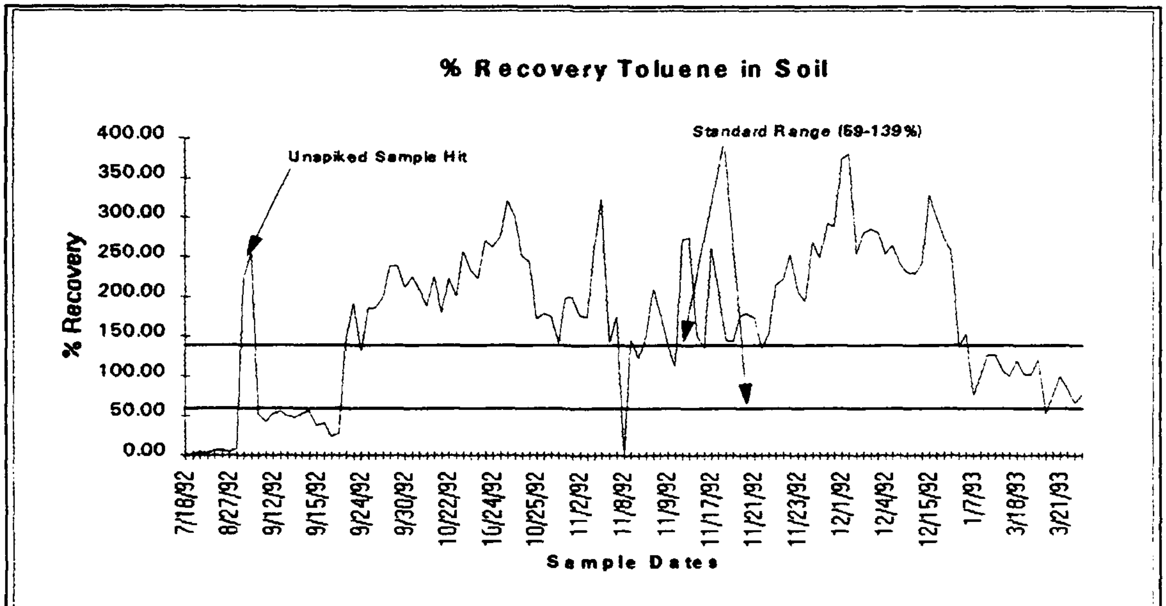



Fig. 24. Chronological Presentation of %R Values for Toluene in Soil

Even though the overall accuracy analysis of the soil results for the volatile organics indicates a complete breakdown in the quality of the data, the trend analysis indicates that there were likely problems within the operation of the lab that were corrected over time and that the use of field analytical techniques may in fact be feasible for generating highly accurate and usable soils analysis. Despite the appearance of an unacceptable data set in this case, field generated data still has potential for use.

**Comparison of Field vs. CLP Generated Data**

A direct comparison of data from the on-site lab to that from off-site CLP analyses was initially attempted but proved to be nearly impossible. The difficulties in such a comparison stem from the lack of true split samples; one going to the on-site lab and the other being shipped off-site for CLP analysis. Attempts were made to match up soil samples taken from the same depth intervals and the same boring for such a comparison and water samples taken during drilling from a specified depth interval to later well samples from an equivalent screen depth. Appendix G contains the results of this comparison for water and Appendix H contains those for soil. The match-ups of comparative samples was somewhat successful as we see a fairly consistent confirmation of those on-site samples showing indications of a given contaminant by similar indications in the CLP sample.

With both the water and the soil data comparisons another critical problem was with differing reportable values based on the detection limits for on-site analysis and the quantitation limits for off-site analysis. The quantitation limits for the off-site CLP lab results were consistently much higher than those associated with the on-site lab results, thus resulting in a fairly consistent discrepancy in reported values. A comparison of detection limits for the on-site lab to the quantitation limits for the off-site lab was shown in Table 18. This made it impossible to evaluate the discrepancies in the data due to the fairly consistent difference in reporting quantities. When contaminants were detected in each comparable sample the on-site samples were typically

biased high as compared to the off-site analyses. This more conservative result from the field lab combined with the fact that the on-site lab was better able to detect any level of contamination enforces the claim for its use as a viable option for generating usable data.

# V. POTENTIAL COST IMPLICATIONS OF RELIANCE ON FIELD GENERATED DATA

As stated earlier, an increased use and reliance on field generated data can result in significant savings in a CERCLA investigation. There may have to be some level of sacrifice of overall data quality, but as was seen in the preceding sections of this study, the sacrifices may actually be very minimal. Therefore, to realize the optimal cost savings associated with use of field analytical data one must establish a level of trust in the data to eliminate great numbers of samples sent off-site for more stringent analysis.

The cost savings would increase significantly with an increasing size of the environmental investigation utilizing hypothetical cost growth curves seen in Figure 25. These curves are based on a consistent cost per sample for CLP analysis and on-site analysis as listed in Table 4. There was an adjustment to the cost per sample for on-site analysis to $144/sample to remove capital costs for on-site lab equipment, trailer, etc. The total on-site analysis cost figures as presented in Figure 26 also includes a capital cost for establishing an on-site lab with the appropriate organic analysis equipment (e.g., gas chromatograph) and supplies . The capital cost used is $19,000 and is based on figures from WPAFB Operable Unit 5 equipment costs for the on-site lab. The cost per sample includes costs for manpower and supplies.

The curves in Figure 25 represent the total analytical cost based on the number of samples for 100% reliance on off-site CLP analyses, for 100% reliance on on-site field lab generated analyses, and for an optimal mix of field generated data with 10% CLP verification analyses. These figures are based on constant cost per sample and may vary from lab to lab or from project site to project site. Some economies of scale may be realized with increasing number of samples.

Figure 25 offers a graphic presentation of the potential cost savings realized with an increased reliance on field generated data. With the capital cost of establishing a field lab, with all appropriate equipment (GC), one can see that for smaller projects (projects requiring less than approximately 80 sample analyses) it would be more cost effective to send all samples off-site for

detailed CLP analysis. With increasing project size, the potential savings increase tremendously. Since many remedial investigations at CERCLA/IRP sites result in much more than 500+ samples, we can see that the cost savings would easily be well over $100,000 per project.

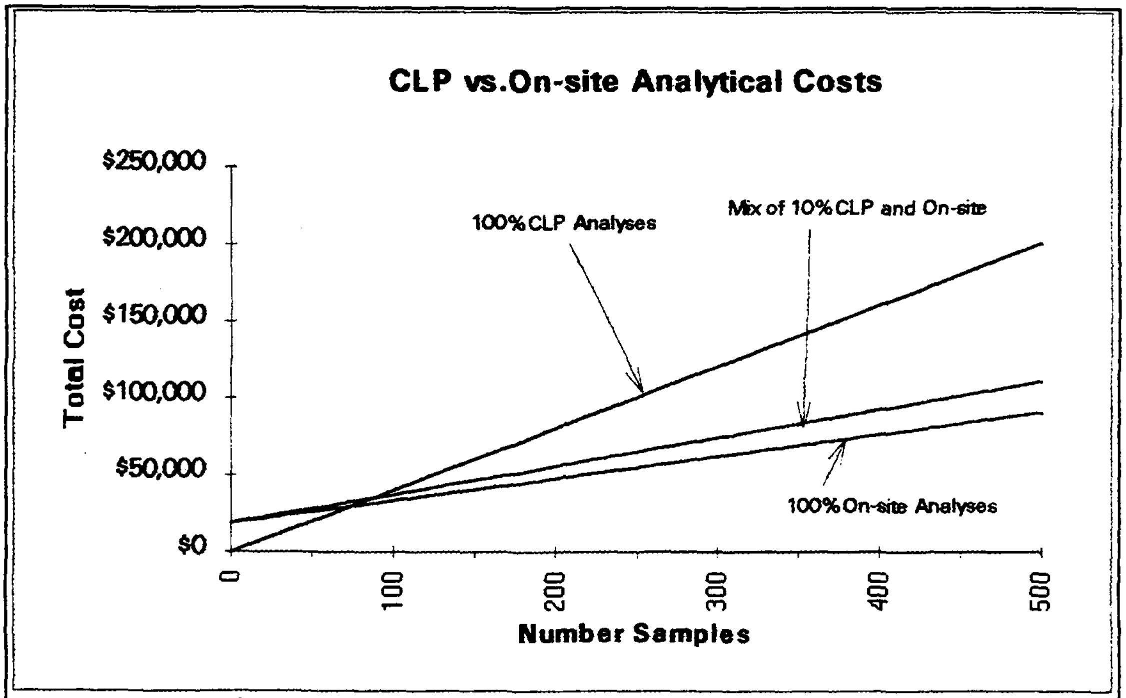



Fig. 25. Cost Growth Curves for CLP vs. On-site Analyses

It's important to recognize that the cost figures presented in Figure 25 are for VOC analysis alone. With the expansion of an on-site field lab to allow for additional analyses the cost savings could be much greater. The remedial investigation at WPAFB offers a prime example. There, the total cost of the project to date (there remain only some ongoing administrative functions) is $14.5 Million. Of this, approximately $4.3 Million has been spent on CLP analytical services, including data validation (Helms, 1994). If 10% of the samples were analyzed via CLP procedures and the remaining on-site, the analytical costs for this project could be reduced to approximately $1.9 Million; a potential savings of approximately $2.4 Million.

The potential exists for additional cost savings in the elimination of sampling remobilization costs possibly incurred if samples were collected, shipped off-site for a lengthy analyses, and results indicate additional sampling or re-sampling is necessary. Furthermore, with

an increased reliance on field lab data there could likely be a need for a reduced number of permanent sampling locations such as ground water monitoring wells (Taylor, 1994:23).

One additional consideration not factored into the above potential cost saving calculations is that associated with project schedule reduction. If there is a reliance on field generated data for making all field decisions regarding follow-on sample locations and the needs for additional samples, a significant reduction in the project schedule could be realized. These schedule reductions would be the result of the field team having the ability to maintain a single sampling program and avoiding demobilization while awaiting results and remobilization once results are received and reviewed. This reduction in project schedule, as much as 10-12 months, would eliminate excessive contract overhead costs associated with maintaining idle sampling/analysis personel while awaiting results from previous sampling efforts.

# VI. CONCLUSIONS AND RECOMMENDATIONS

## Overview

The primary purpose of this study was to show the overall quality of environmental analytical data is a function of basic QA/QC and if general standards for this QA/QC (based on data useability criteria) are met the data is sufficient for use in risk assessment calculations. This should hold true for data generated via many different techniques, especially the more economical field lab analyses.

The importance of use of field analytical techniques is getting greater recognition in industry and government. At least one state (South Carolina) has begun the development and establishment of regulations to require the use of field screening tools in underground storage tank site assessment (Taylor, 1994:20). Also in the underground storage tank program at U.S. EPA, there exists a recently funded research initiative to study and develop field analytical techniques in hope of improving the site characterization process (Taylor, 1994:18).

As a proposed method for assessing the quality of an on-site generated data base, a set of evaluation criteria was established based on the data quality measuring tools touted in EPA guidance documentation and practical statistical techniques. This led to an extensive review of EPA guidance and regulations for any existing standards of measure and data quality assessment tools.

The set of data quality assessment standards was established with the intent that they be stringent enough to be applicable to the most demanding data requirement; the baseline risk assessment. The standards were then tested on data sets of both CLP generation and field lab generation to evaluate their applicability. The summary of results and conclusions drawn based on these tests follows.

## Conclusions

An overall assessment of the standards as established in this document and their application to the data bases herein indicates that the standards offer a very stringent and conservative tool for determining the useability of environmental analytical data on such data uses as risk assessment. This conclusion is drawn based on the difficulty for the data bases to pass the appropriate standards, most importantly, the difficulty as seen with the CLP data. The CLP protocol represents data that has been thoroughly reviewed and validated by lengthy and detailed procedures and found acceptable by analytical and chemical professionals in the contract and regulatory arenas. Therefore, any data successfully passing the tests of quality established herein can be labeled as data of very high quality with wide spread applications.

The data quality assessment procedures used in this study do not alleviate the requirement for the generation of sufficient QA/QC as part of the environmental data collection process. If anything, the results discussed here strengthen the importance of the collection of matrix spike and duplicate analyses for the generation of adequate relative percent difference and percent recovery values. In association with the analyses of matrix spike samples it is imperative that there be accurate measurements of amounts of contaminants within a sample spike. Although there can be an elimination of trip blanks with the use of field labs there still needs to be some level of field and rinseate blanks to monitor for unintentionally induced contamination. One possibility of further enhancing the measure of lab performance is through the use of performance evaluation samples in place of or in addition to matrix spike samples.

The performance of the CLP data base obtained from Wright-Patterson AFB Operable Unit 1 as measured against the established standards was not as expected. On the basis of the results, the data base would not be recommended for use in risk assessment calculations. The first recognized weakness in the assessment process is with the Data Sources evaluation which points out that the CLP data base has no confirmatory analyses conducted by an independent lab as would be done in the use of a field lab with its 10% minimum CLP verification analyses. There

would be a complete dependence on the CLP data set alone and any consistent deviation in the process used could go undetected.

Although the analytical methods used in the CLP data set easily meet the standards, due to consistent and detailed SOP's as specified in the CLP statement-of-work, there was a failure to meet the minimum standards for some compound detection limits. The CLP analyses did not achieve the specified detection limits for chloroform, carbon tetrachloride and benzene in water. This failure may not be so critical when it is recognized that the detection limits were still well below the risk based drinking water standards. Therefore the methods could detect, with reasonable assurance, any level of contaminant that could pose a health risk.

With regard to the tests for appropriate precision and accuracy the CLP data fared poorly. Both benzene and toluene failed the test for precision in water and xylene and toluene failed the precision test in soils. On the basis of these facts, the CLP methodology had the most difficulty consistently measuring levels of toluene in the environmental samples. Unfortunately, the CLP QA/QC protocol for accuracy measurements was limited to only three volatile organic contaminants of concern; TCE, toluene, and benzene. All three contaminants failed the test for accuracy in water and TCE and toluene failed the test in soils.

On the basis of these results, the data set of CLP analytical results should not be suitable for use in risk assessment calculations. The fact is that the US and state EPAs approved of this data set for its use in both qualitative and quantitative risk assessments. Since these are the same standards we propose to use in the evaluation of on-site generated data quality the results on the CLP data suggest the need for less stringent standards. This could be done on the precision test by using more relaxed percentile requirements on the RPD assessment (e.g., 80%). Or possibly a greater emphasis on the mean RPD value of the samples and its relation to the minimum allowable RPD standard or to zero percent difference. As for the accuracy test, an increase in the confidence interval (decrease in $\alpha$ value) for the sample mean being from same population as 100% recovery.

The test of the standards on the on-site generated data base from Wright-Patterson AFB Operable Unit 2 were much better than that seen on the CLP data with one significant exception. The accuracy of measurements on soil samples was a total failure but the potential cause of this failure is discussed below and may be preventable by alterations in the soil sample extraction procedures or simply by better trained lab operators.

The on-site data easily met the requirement for a minimum of 10% off-site verification due to the project reliance on CLP data for risk assessment and other remedial decisions. On the basis of the theory of this study, this is an area in most CERCLA/IRP projects where lessening the dependency on CLP data could decrease costs.

The methods used by the on-site lab were EPA approved methods but not necessarily for use in risk assessment data generation. The detection limits achieved by the on-site lab were exceptional; much better than those seen in the CLP analyses and than those required by the standards. This raises the question of whether the achieved detection limits were necessary or are they too low. A relaxation of the detection limits closer to those required by the standards may make the analyses easier, more accurate, and result in less costs.

In the test for precision, the on-site analysis failed to meet the minimum percentile standard for relative percent difference for ethylbenzene (87.5%), xylene (85%), chloroform (85%), and 1,1,1-TCA (87.5%). With the soil analyses the on-site lab failed for ethylbenzene (89%) and xylene (88%). The levels by which these contaminants failed the precision test are similar to those we saw for the CLP data; they are not significantly below the standard as established. Also, as seen below in a table comparing mean RPD values for given contaminants from CLP and on-site analyses, there is a much better performance in the on-site data for soil analyses. With the exception of TCE, all contaminants displayed a higher mean RPD in the soils analyses conducted in the CLP lab. The comparison of mean RPD values in the water analyses is much more comparable. Again, as mentioned in the discussion of CLP precision results above, a lower RPD percentile standard requiring only 80-85% of the values to be within the maximum allowable RPD

TABLE 24
COMPARISON OF MEAN RPD IN SOILS ANALYSIS

| | On-site Soil Mean RPD | CLP Soil Field Dup Mean RPD | CLP Matrix Spike Dup Mean RPD |
|---|---|---|---|
| Benzene | 6.67 | 11.29 | 8.3 |
| Toluene | 7.88 | 24.98 | 8.8 |
| Ethylbenzene | 7.51 | 8.69 | NA |
| Xylene | 7.59 | 24.88 | NA |
| Chloroform | 3.71 | 5.77 | NA |
| 1,1,1-TCA | 4.77 | 5.43 | NA |
| Carbon Tet. | 4.57 | 5.77 | NA |
| TCE | 6.64 | 6.05 | 7.0 |
| PCE | 7.61 | 12.06 | NA |

would have resulted in all the contaminants passing the standard in both media. In summary, the on-site lab displayed the best precision in its analysis of the halogenated hydrocarbons (chloroform, carbon tetrachloride, 1,1,1-TCA, TCE, and PCE) where the monoaromatic hydrocarbons (xylene, benzene, toluene, and ethylbenzene) were not as strong. Surprisingly the p.ecision was not as good in the analysis of water samples as it was for the soils. This would not be expected due to the more homogeneous nature of water as compared to the strongly variable nature of soil samples.

The accuracy assessment standards as established proved to be difficult for the on-site data to pass, as was true for the CLP data. The mean percent recovery value of the sample data and the standard deviation play key roles in this test. Where benzene and toluene analyses in water at the CLP lab failed the test for accuracy with fairly strong mean recoveries, the same compounds with similarly accurate mean recoveries in the on-site results passed the test for accuracy. This was due to higher standard deviations and lower sample size in the on-site data set.

In the accuracy assessment of the on-site analyses of water the monoaromatic hydrocarbons appeared to be the strong performers where the halogenated hydrocarbons, with the exception of PCE, all failed the test for accuracy. This could possibly be a result of chlorine in these compounds binding or reacting with the water matrix. Thus, in the on-site water analyses,

the halogenated hydrocarbons showed the best precision analyses and the monoaromatic hydrocarbons had the best accuracy.

With the assessment of accuracy in the on-site analyses of soils there were some definite problems. The on-site analyses failed to pass the t-test for accuracy for all the volatile contaminants of concern. All averaged a very high bias in the measurements of known concentrations but as seen in the chronological analysis of the results there was some well defined variability in the measurements. This appears to be a result of the extraction procedures associated with the soil sample preparation and/or the influence of the individual lab operator(s).

### Recommendations

The purpose of this study, to develop a methodology for assuring the necessary quality of environmental data to be utilized in assessing on-site lab performance, remains one of great importance to the environmental restoration industry. This study has taken a large step toward that development but has also left much room for additional study and refinement. Following are some of those opportunities.

This study applied the data quality criteria to only one data set from a single remedial investigation project. Therefore the testing was limited in scope. The parameters established herein could benefit from the additional application to other data sets developed from other on-site laboratories (and even other CLP lab data sets). The on-site data set used in this study came from the initial attempt at Wright-Patterson AFB to utilize an on-site lab for limited field decision purposes. There are currently four additional projects ongoing at WPAFB in which similar on-site lab set-ups are being used, thus generating additional data sets to soon be available for similar analysis as was accomplished in this study.

This study did not explicitly review the details of the actual methodologies used in the two lab situations evaluated; the CLP lab protocol and the on-site field lab. The similarities, strengths, weaknesses, and overall benefits of each (and any other potential analytical source) could be

further studied with the intended result being the development of optimal procedures and equipment for use in the economical and accurate generation of environmental data in the field.

This study alluded to the potential for lessening the standards for the qualification of acceptable data for risk assessment use. The study concentrated on the EPA recommended guidelines for the establishment of the standards and found that not even the commonly accepted and approved CLP data could fully meet these standards. Follow-on studies could pursue this possibility concentrating on typical performance of CLP analyses based on the measurement devices set-up in this study to establish criteria and standards based on the minimal CLP performance. These standards could then again be applied to on-site generated data bases in a similar manner accomplished herein.

The requirements for quality in data to be utilized in the risk assessment process are likely the most stringent due to the potential implications of the risk calculations and the importance of their accuracy. There is an opportunity for the development of variable standards based on the ultimate intended use of the data in the CERCLA process. There may be opportunities for the generation of data at a lesser cost, resulting in slightly less stringent quality standards, for the use in other than risk assessment such as plume chasing/delineation, remedial action monitoring or preliminary site evaluations/property assessments.

The variable impacts of differing standards for data quality as they effect risk calculations can also be studied. A significant reduction or tightening of data quality standards may result in only minor impacts on risk values and therefore may not be worthy of the additional cost, effort and time necessary to generate such tight data.

This study was also limited to only volatile organic compounds. There are also many CERCLA/IRP sites that contain several other types of contaminants or combinations of contaminants. Thus, there exist an opportunity for the expansion of the criteria established herein for the application to other contaminant groups such as semi-volatile organics, metals, or pesticides/PCBs.

**APPENDIX A**
**Data Sheets for Relative Percent Difference Calculations--Water**

FIELD ANALYTICAL DUPLICATE RESULTS FOR BENZENE IN WATER

(Results in micrograms per liter)

RPD = Relative Percent Difference

| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
|---|---|---|---|---|---|
| MW01-1S | AFTDEV | | 0.5 | 0.5 | 0.00 |
| MW02-1D | 9-11 | | 0.5 | 0.5 | 0.00 |
| MW10-1D | 36-40 | * | 77 | 69 | 10.96 |
| MW25-1D | 40-42 | | 58 | 52 | 10.91 |
| MW25-1D | 65-67 | | 0.5 | 0.5 | 0.00 |
| PZ14 | 11-13 | * | 53 | 52 | 1.90 |
| MW26-1I | 39-43 | * | 21.8 | 23.1 | 5.79 |
| MW16-1D | 38-40 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 18-20 | | 870 | 800 | 8.38 |
| MW21-1D | 30-32 | | 1.9 | 2.3 | 19.05 |
| MW27-2D | 19-21 | | 1.1 | 1 | 9.52 |
| MW27-2D | 38-40 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 14-17 | * | 49 | 50 | 2.02 |
| MW27-2D | 46-48 | | 0.5 | 0.5 | 0.00 |
| MW17-1D | 9-10.5 | | 1 | 1 | 0.00 |
| MW17-2D | 10 | | 3.3 | 3.3 | 0.00 |
| MW17-2D | 68-70 | * | 51 | 53 | 3.85 |
| MW05-2S | 12-14 | | 0.85 | 0.78 | 8.59 |
| MW27-3I | 28-30 | | 0.5 | 0.5 | 0.00 |
| MW05-3D | 35-37 | | 0.5 | 0.5 | 0.00 |
| MW05-3D | 53-55 | * | 50 | 57 | 13.08 |
| MW19-1D | 38-40 | | 0.5 | 0.5 | 0.00 |
| P318 | 45-50 | | 0.5 | 0.5 | 0.00 |
| MW33-1D | 13-15 | | 1.9 | 2.1 | 10.00 |
| MW33-1D | 31-33 | * | 54 | 54 | 0.00 |
| MW34-1D | 11-13 | | 4.1 | 4.7 | 13.64 |
| MW35-1D | 46-48 | * | 50 | 49 | 2.02 |
| 14-553-M | 8.3-18.3 | | 0.5 | 0.5 | 0.00 |
| MW23-2S | 8.25-12.95 | | 0.5 | 0.5 | 0.00 |
| MW22-3S | 6.6-16.5 | | 2.2 | 2.1 | 4.65 |
| MW26-2I | 36.5-41.3 | | 0.5 | 0.5 | 0.00 |
| MW28-4I | 28-33 | | 100 | 100 | 0.00 |
| MW36-1D | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW36-1D | 70-72 | * | 51.1 | 49.8 | 2.58 |
| MW21-3S | 8.9-18.9 | | 2800 | 2800 | 0.00 |
| SB66 | 23-25 | | 0.5 | 0.5 | 0.00 |
| SB66 | 33-35 | * | 25.3 | 30.6 | 18.96 |
| MW38-1I | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 103-105 | * | 48.2 | 45.2 | 6.42 |

| FIELD ANALYTICAL DUPLICATE RESULTS FOR TOLUENE IN WATER | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per liter) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW01-1S | AFTDEV | | 0.5 | 0.5 | 0.00 |
| MW02-1D | 9-11 | | 0.5 | 0.5 | 0.00 |
| MW10-1D | 36-40 | * | 72 | 66 | 8.70 |
| MW25-1D | 40-42 | | 6.3 | 4.8 | 27.03 |
| MW25-1D | 65-67 | | 0.53 | 0.5 | 5.83 |
| PZ14 | 11-13 | * | 51 | 52 | 1.94 |
| MW26-1I | 39-43 | * | 21.6 | 23.7 | 9.27 |
| MW16-1D | 38-40 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 18-20 | | 70 | 81 | 14.57 |
| MW21-1D | 30-32 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 19-21 | | 2.4 | 2.8 | 15.38 |
| MW27-2D | 38-40 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 14-17 | * | 48 | 51 | 6.06 |
| MW27-2D | 46-48 | | 0.52 | 0.5 | 3.92 |
| MW17-1D | 9-10.5 | | 1.5 | 1.7 | 12.50 |
| MW17-2D | 10 | | 4.9 | 5.7 | 15.09 |
| MW17-2D | 68-70 | * | 50 | 51 | 1.98 |
| MW05-2S | 12-14 | | 2.4 | 2.2 | 8.70 |
| MW27-3I | 28-30 | | 0.5 | 0.5 | 0.00 |
| MW05-3D | 35-37 | | 0.5 | 0.5 | 0.00 |
| MW05-3D | 53-55 | * | 47 | 53 | 12.00 |
| MW19-1D | 38-40 | | 0.5 | 0.5 | 0.00 |
| P318 | 45-50 | | 0.5 | 0.5 | 0.00 |
| MW33-1D | 13-15 | | 2.6 | 2.9 | 10.91 |
| MW33-1D | 31-33 | * | 55 | 52 | 5.61 |
| MW34-1D | 11-13 | | 5.5 | 4.9 | 11.54 |
| MW35-1D | 46-48 | * | 47 | 49 | 4.17 |
| 14-553-M | 8.3-18.3 | | 0.5 | 0.5 | 0.00 |
| MW23-2S | 8.25-12.95 | | 25 | 25 | 0.00 |
| MW22-3S | 6.6-16.5 | | 19 | 21 | 10.00 |
| MW26-2I | 36.5-41.3 | | 0.5 | 0.5 | 0.00 |
| MW28-4I | 28-33 | | 0.5 | 0.5 | 0.00 |
| MW36-1D | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW36-1D | 70-72 | * | 48 | 51.2 | 6.45 |
| MW21-3S | 8.9-18.9 | | 280 | 280 | 0.00 |
| SB66 | 23-25 | | 0.5 | 0.5 | 0.00 |
| SB66 | 33-35 | * | 21.1 | 24 | 12.86 |
| MW38-1I | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 103-105 | * | 46.5 | 44.4 | 4.62 |

| | | | | | |
|---|---|---|---|---|---|
| FIELD ANALYTICAL DUPLICATE RESULTS FOR ETHYLBENZENE IN WATER | | | | | |
| (Results in micrograms per liter) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| | | Matrix | | Duplicate | |
| Sample # | Depth | Spike | Conc. | Conc. | RPD |
| MW01-1S | AFTDEV | | 0.5 | 0.5 | 0.00 |
| MW02-1D | 9-11 | | 0.5 | 0.5 | 0.00 |
| MW10-1D | 36-40 | * | 61 | 67 | 9.38 |
| MW25-1D | 40-42 | | 0.5 | 0.5 | 0.00 |
| MW25-1D | 65-67 | | 0.5 | 0.5 | 0.00 |
| PZ14 | 11-13 | * | 49 | 46 | 6.32 |
| MW26-1I | 39-43 | * | 20.2 | 23.4 | 14.68 |
| MW16-1D | 38-40 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 18-20 | | 52 | 55 | 5.61 |
| MW21-1D | 30-32 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 19-21 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 38-40 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 14-17 | * | 52 | 54 | 3.77 |
| MW27-2D | 46-48 | | 0.5 | 0.5 | 0.00 |
| MW17-1D | 9-10.5 | | 0.66 | 0.84 | 24.00 |
| MW17-2D | 10 | | 2.9 | 2.5 | 14.81 |
| MW17-2D | 68-70 | * | 50 | 49 | 2.02 |
| MW05-2S | 12-14 | | 0.5 | 0.5 | 0.00 |
| MW27-3I | 28-30 | | 0.5 | 0.5 | 0.00 |
| MW05-3D | 35-37 | | 0.5 | 0.5 | 0.00 |
| MW05-3D | 53-55 | * | 45 | 52 | 14.43 |
| MW19-1D | 38-40 | | 0.5 | 0.5 | 0.00 |
| P318 | 45-50 | | 0.5 | 0.5 | 0.00 |
| MW33-1D | 13-15 | | 0.5 | 0.5 | 0.00 |
| MW33-1D | 31-33 | * | 57 | 54 | 5.41 |
| MW34-1D | 11-13 | | 1.4 | 1.5 | 6.90 |
| MW35-1D | 46-48 | * | 49 | 48 | 2.06 |
| 14-553-M | 8.3-18.3 | | 0.5 | 0.5 | 0.00 |
| MW23-2S | 8.25-12.95 | | 0.5 | 0.5 | 0.00 |
| MW22-3S | 6.6-16.5 | | 0.5 | 0.5 | 0.00 |
| MW26-2I | 36.5-41.3 | | 0.5 | 0.5 | 0.00 |
| MW28-4I | 28-33 | | 0.5 | 0.5 | 0.00 |
| MW36-1D | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW36-1D | 70-72 | * | 52.4 | 54.7 | 4.30 |
| MW21-3S | 8.9-18.9 | | 160 | 160 | 0.00 |
| SB66 | 23-25 | | 0.5 | 0.5 | 0.00 |
| SB66 | 33-35 | * | 21.1 | 27.4 | 25.98 |
| MW38-1I | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 103-105 | * | 46.4 | 42.2 | 9.48 |

| | | | | | |
|---|---|---|---|---|---|
| FIELD ANALYTICAL DUPLICATE RESULTS FOR O-XYLENE IN WATER | | | | | |
| (Results in micrograms per liter) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| | | Matrix | | Duplicate | |
| Sample # | Depth | Spike | Conc. | Conc. | RPD |
| MW01-1S | AFTDEV | | 0.5 | 0.5 | 0.00 |
| MW02-1D | 9-11 | | 0.5 | 0.5 | 0.00 |
| MW10-1D | 36-40 | * | 55 | 62 | 11.97 |
| MW25-1D | 40-42 | | 0.5 | 0.5 | 0.00 |
| MW25-1D | 65-67 | | 0.58 | 0.5 | 14.81 |
| PZ14 | 11-13 | * | 56 | 57 | 1.77 |
| MW26-1I | 39-43 | * | 38.4 | 44.9 | 15.61 |
| MW16-1D | 38-40 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 18-20 | | 52 | 80 | 42.42 |
| MW21-1D | 30-32 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 19-21 | | 1.5 | 1.5 | 0.00 |
| MW27-2D | 38-40 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 14-17 | * | 105 | 104 | 0.96 |
| MW27-2D | 46-48 | | 0.5 | 0.5 | 0.00 |
| MW17-1D | 9-10.5 | | 0.46 | 0.52 | 12.24 |
| MW17-2D | 10 | | 4.7 | 3.7 | 23.81 |
| MW17-2D | 68-70 | * | 97 | 86 | 12.02 |
| MW05-2S | 12-14 | | 1.6 | 1.2 | 28.57 |
| MW27-3I | 28-30 | | 0.5 | 0.5 | 0.00 |
| MW05-3D | 35-37 | | 0.5 | 0.5 | 0.00 |
| MW05-3D | 53-55 | * | 43 | 53 | 20.83 |
| MW19-1D | 38-40 | | 0.5 | 0.5 | 0.00 |
| P318 | 45-50 | | 0.5 | 0.5 | 0.00 |
| MW33-1D | 13-15 | | 1.4 | 1.5 | 6.90 |
| MW33-1D | 31-33 | * | 58 | 54 | 7.14 |
| MW34-1D | 11-13 | | 1.4 | 1.3 | 7.41 |
| MW35-1D | 46-48 | * | 47 | 49 | 4.17 |
| 14-553-M | 8.3-18.3 | | 0.5 | 0.5 | 0.00 |
| MW23-2S | 8.25-12.95 | | 0.5 | 0.5 | 0.00 |
| MW22-3S | 6.6-16.5 | | 0.5 | 0.5 | 0.00 |
| MW26-2I | 36.5-41.3 | | 0.5 | 0.5 | 0.00 |
| MW28-4I | 28-33 | | 0.5 | 0.5 | 0.00 |
| MW36-1D | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW36-1D | 70-72 | * | 53.5 | 58.9 | 9.61 |
| MW21-3S | 8.9-18.9 | | 220 | 210 | 4.65 |
| SB66 | 23-25 | | 0.5 | 0.5 | 0.00 |
| SB66 | 33-35 | * | 27 | 27.2 | 0.74 |
| MW38-1I | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 23-25 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 103-105 | * | 47.8 | 44.8 | 6.48 |

| | | | | | |
|---|---|---|---|---|---|
| FIELD ANALYTICAL DUPLICATE RESULTS FOR CHLOROFORM IN WATER | | | | | |
| (Results in micrograms per liter) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| | | Matrix | | Duplicate | |
| Sample # | Depth | Spike | Conc. | Conc. | RPD |
| MW01-1S | AFTDEV | | 2.2 | 1.8 | 20.00 |
| MW02-1D | 9-11 | | 0.45 | 0.5 | 10.53 |
| MW10-1D | 36-40 | * | 12 | 11 | 8.70 |
| MW25-1D | 40-42 | | 0.2 | 0.2 | 0.00 |
| MW25-1D | 65-67 | | 0.2 | 0.2 | 0.00 |
| PZ14 | 11-13 | * | 8.3 | 8.1 | 2.44 |
| MW26-1I | 39-43 | * | 4 | 4.3 | 7.23 |
| MW16-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 18-20 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 30-32 | | 0.2 | 0.2 | 0.00 |
| MW27-2D | 19-21 | | 0.2 | 0.2 | 0.00 |
| MW27-2D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW24-1D | 14-17 | * | 8.1 | 8.6 | 5.99 |
| MW27-2D | 46-48 | | 0.2 | 0.2 | 0.00 |
| MW17-1D | 9-10.5 | | 0.19 | 0.15 | 23.53 |
| MW17-2D | 10 | | 0.42 | 0.42 | 0.00 |
| MW17-2D | 68-70 | * | 8.6 | 9.1 | 5.65 |
| MW05-2S | 12-14 | | 0.2 | 0.2 | 0.00 |
| MW27-3I | 28-30 | | 0.2 | 0.2 | 0.00 |
| MW05-3D | 35-37 | | 1.3 | 1.3 | 0.00 |
| MW05-3D | 53-55 | * | 10.2 | 10.2 | 0.00 |
| MW19-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| P318 | 45-50 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 13-15 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 31-33 | * | 9 | 8.6 | 4.55 |
| MW34-1D | 11-13 | | 0.5 | 0.61 | 19.82 |
| MW35-1D | 46-48 | * | 8.6 | 8.5 | 1.17 |
| 14-553-M | 8.3-18.3 | | 0.2 | 0.2 | 0.00 |
| MW23-2S | 8.25-12.95 | | 0.2 | 0.47 | 80.60 |
| MW22-3S | 6.6-16.5 | | 0.2 | 0.2 | 0.00 |
| MW26-2I | 36.5-41.3 | | 0.2 | 0.2 | 0.00 |
| MW28-4I | 28-33 | | 0.47 | 0.2 | 80.60 |
| MW36-1D | 23-25 | | 0.2 | 0.2 | 0.00 |
| MW36-1D | 70-72 | * | 8.8 | 9 | 2.25 |
| MW21-3S | 8.9-18.9 | | 0.5 | 0.5 | 0.00 |
| SB66 | 23-25 | | 0.44 | 0.45 | 2.25 |
| SB66 | 33-35 | * | 5.2 | 5.4 | 3.77 |
| MW38-1I | 23-25 | | 0.64 | 0.64 | 0.00 |
| MW39-1D | 23-25 | | 0.2 | 0.2 | 0.00 |
| MW39-1D | 103-105 | * | 9.4 | 8.1 | 14.86 |

FIELD ANALYTICAL DUPLICATE RESULTS FOR 1,1,1-TCA IN WATER

(Results in micrograms per liter)

RPD = Relative Percent Difference

| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
|---|---|---|---|---|---|
| MW01-1S | AFTDEV | | 0.97 | 0.92 | 5.29 |
| MW02-1D | 9-11 | | 0.78 | 0.66 | 16.67 |
| MW10-1D | 36-40 | * | 11 | 9.8 | 11.54 |
| MW25-1D | 40-42 | | 0.2 | 0.2 | 0.00 |
| MW25-1D | 65-67 | | 0.2 | 0.2 | 0.00 |
| PZ14 | 11-13 | * | 7.8 | 8.2 | 5.00 |
| MW26-1I | 39-43 | * | 3.2 | 4.3 | 29.33 |
| MW16-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 18-20 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 30-32 | | 0.31 | 0.28 | 10.17 |
| MW27-2D | 19-21 | | 0.16 | 0.16 | 0.00 |
| MW27-2D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW24-1D | 14-17 | * | 8.1 | 8.4 | 3.64 |
| MW27-2D | 46-48 | | 0.2 | 0.2 | 0.00 |
| MW17-1D | 9-10.5 | | 0.27 | 0.23 | 16.00 |
| MW17-2D | 10 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 68-70 | * | 7.8 | 8.3 | 6.21 |
| MW05-2S | 12-14 | | 0.2 | 0.2 | 0.00 |
| MW27-3I | 28-30 | | 0.2 | 0.2 | 0.00 |
| MW05-3D | 35-37 | | 0.96 | 0.98 | 2.06 |
| MW05-3D | 53-55 | * | 8.4 | 8.8 | 4.65 |
| MW19-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| P318 | 45-50 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 13-15 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 31-33 | * | 8.6 | 8.4 | 2.35 |
| MW34-1D | 11-13 | | 0.5 | 0.61 | 19.82 |
| MW35-1D | 46-48 | * | 7.7 | 7.8 | 1.29 |
| 14-553-M | 8.3-18.3 | | 0.2 | 0.2 | 0.00 |
| MW23-2S | 8.25-12.95 | | 0.2 | 0.2 | 0.00 |
| MW22-3S | 6.6-16.5 | | 0.2 | 0.2 | 0.00 |
| MW26-2I | 36.5-41.3 | | 0.2 | 0.2 | 0.00 |
| MW28-4I | 28-33 | | 0.2 | 0.2 | 0.00 |
| MW36-1D | 23-25 | | 0.2 | 0.2 | 0.00 |
| MW36-1D | 70-72 | * | 8 | 8.2 | 2.47 |
| MW21-3S | 8.9-18.9 | | 0.5 | 0.5 | 0.00 |
| SB66 | 23-25 | | 0.81 | 0.82 | 1.23 |
| SB66 | 33-35 | * | 4.9 | 5.4 | 9.71 |
| MW38-1I | 23-25 | | 1.5 | 1.4 | 6.90 |
| MW39-1D | 23-25 | | 0.2 | 0.2 | 0.00 |
| MW39-1D | 103-105 | * | 9.2 | 7.8 | 16.47 |

| FIELD ANALYTICAL DUPLICATE RESULTS FOR CARBON TETRACHLORIDE IN WATER | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per liter) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW01-1S | AFTDEV | | 0.2 | 0.2 | 0.00 |
| MW02-1D | 9-11 | | 0.2 | 0.2 | 0.00 |
| MW10-1D | 36-40 | * | 6.5 | 5.8 | 11.38 |
| MW25-1D | 40-42 | | 0.2 | 0.2 | 0.00 |
| MW25-1D | 65-67 | | 0.2 | 0.2 | 0.00 |
| PZ14 | 11-13 | * | 3.8 | 4.1 | 7.59 |
| MW26-1I | 39-43 | * | 1.7 | 2.4 | 34.15 |
| MW16-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 18-20 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 30-32 | | 0.2 | 0.2 | 0.00 |
| MW27-2D | 19-21 | | 0.2 | 0.2 | 0.00 |
| MW27-2D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW24-1D | 14-17 | * | 4.8 | 4.9 | 2.06 |
| MW27-2D | 46-48 | | 0.2 | 0.2 | 0.00 |
| MW17-1D | 9-10.5 | | 0.2 | 0.2 | 0.00 |
| MW17-2D | 10 | | 0.2 | 0.2 | 0.00 |
| MW17-2D | 68-70 | * | 4.6 | 4.9 | 6.32 |
| MW05-2S | 12-14 | | 0.2 | 0.2 | 0.00 |
| MW27-3I | 28-30 | | 0.2 | 0.2 | 0.00 |
| MW05-3D | 35-37 | | 0.16 | 0.16 | 0.00 |
| MW05-3D | 53-55 | * | 4.6 | 5.1 | 10.31 |
| MW19-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| P318 | 45-50 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 13-15 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 31-33 | * | 5.1 | 5.2 | 1.94 |
| MW34-1D | 11-13 | | 0.2 | 0.2 | 0.00 |
| MW35-1D | 46-48 | * | 4.7 | 4.7 | 0.00 |
| 14-553-M | 8.3-18.3 | | 0.2 | 0.2 | 0.00 |
| MW23-2S | 8.25-12.95 | | 0.2 | 0.2 | 0.00 |
| MW22-3S | 6.6-16.5 | | 0.2 | 0.2 | 0.00 |
| MW26-2I | 36.5-41.3 | | 0.2 | 0.2 | 0.00 |
| MW28-4I | 28-33 | | 0.2 | 0.2 | 0.00 |
| MW36-1D | 23-25 | | 0.2 | 0.2 | 0.00 |
| MW36-1D | 70-72 | * | 5.1 | 5.2 | 1.94 |
| MW21-3S | 8.9-18.9 | | 0.5 | 0.5 | 0.00 |
| SB66 | 23-25 | | 0.2 | 0.2 | 0.00 |
| SB66 | 33-35 | * | 2.4 | 2.5 | 4.08 |
| MW38-1I | 23-25 | | 0.21 | 0.21 | 0.00 |
| MW39-1D | 23-25 | | 0.2 | 0.2 | 0.00 |
| MW39-1D | 103-105 | * | 5.1 | 4.6 | 10.31 |

FIELD ANALYTICAL DUPLICATE RESULTS FOR TCE IN WATER

(Results in micrograms per liter)

RPD = Relative Percent Difference

| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
|---|---|---|---|---|---|
| MW01-1S | AFTDEV | | 0.2 | 0.2 | 0.00 |
| MW02-1D | 9-11 | | 0.2 | 0.2 | 0.00 |
| MW10-1D | 36-40 | * | 11 | 11 | 0.00 |
| MW25-1D | 40-42 | | 0.2 | 0.2 | 0.00 |
| MW25-1D | 65-67 | | 0.2 | 0.2 | 0.00 |
| PZ14 | 11-13 | * | 8.1 | 8.7 | 7.14 |
| MW26-1I | 39-43 | * | 3.8 | 4.6 | 19.05 |
| MW16-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 18-20 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 30-32 | | 0.2 | 0.2 | 0.00 |
| MW27-2D | 19-21 | | 0.2 | 0.2 | 0.00 |
| MW27-2D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW24-1D | 14-17 | * | 7.7 | 8.3 | 7.50 |
| MW27-2D | 46-48 | | 0.2 | 0.2 | 0.00 |
| MW17-1D | 9-10.5 | | 0.2 | 0.2 | 0.00 |
| MW17-2D | 10 | | 0.2 | 0.2 | 0.00 |
| MW17-2D | 68-70 | * | 8.4 | 8.8 | 4.65 |
| MW05-2S | 12-14 | | 0.2 | 0.2 | 0.00 |
| MW27-3I | 28-30 | | 0.2 | 0.2 | 0.00 |
| MW05-3D | 35-37 | | 0.2 | 0.2 | 0.00 |
| MW05-3D | 53-55 | * | 8.4 | 9.3 | 10.17 |
| MW19-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| P318 | 45-50 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 13-15 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 31-33 | * | 9.2 | 8.8 | 4.44 |
| MW34-1D | 11-13 | | 0.2 | 0.2 | 0.00 |
| MW35-1D | 46-48 | * | 8.4 | 8.5 | 1.18 |
| 14-553-M | 8.3-18.3 | | 0.2 | 0.2 | 0.00 |
| MW23-2S | 8.25-12.95 | | 0.2 | 0.18 | 10.53 |
| MW22-3S | 6.6-16.5 | | 0.2 | 0.2 | 0.00 |
| MW26-2I | 36.5-41.3 | | 0.2 | 0.2 | 0.00 |
| MW28-4I | 28-33 | | 0.18 | 0.2 | 10.53 |
| MW36-1D | 23-25 | | 0.77 | 0.69 | 10.96 |
| MW36-1D | 70-72 | * | 10 | 10.1 | 1.00 |
| MW21-3S | 8.9-18.9 | | 0.5 | 0.5 | 0.00 |
| SB66 | 23-25 | | 5.6 | 6.1 | 8.55 |
| SB66 | 33-35 | * | 7.4 | 8.5 | 13.84 |
| MW38-1I | 23-25 | | 5.5 | 5.3 | 3.70 |
| MW39-1D | 23-25 | | 0.2 | 0.2 | 0.00 |
| MW39-1D | 103-105 | * | 9.4 | 8.2 | 13.64 |

FIELD ANALYTICAL DUPLICATE RESULTS FOR PCE IN WATER

(Results in micrograms per liter)

RPD = Relative Percent Difference

| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
|---|---|---|---|---|---|
| MW01-1S | AFTDEV | | 0.2 | 0.2 | 0.00 |
| MW02-1D | 9-11 | | 0.2 | 0.2 | 0.00 |
| MW10-1D | 36-40 | * | 13 | 12 | 8.00 |
| MW25-1D | 40-42 | | 0.2 | 0.2 | 0.00 |
| MW25-1D | 65-67 | | 0.2 | 0.2 | 0.00 |
| PZ14 | 11-13 | * | 6.3 | 6.9 | 9.09 |
| MW26-1I | 39-43 | * | 2 | 2.5 | 22.22 |
| MW16-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 18-20 | | 0.2 | 0.2 | 0.00 |
| MW21-1D | 30-32 | | 0.2 | 0.2 | 0.00 |
| MW27-2D | 19-21 | | 5.6 | 5.6 | 0.00 |
| MW27-2D | 38-40 | | 6.2 | 6.7 | 7.75 |
| MW24-1D | 14-17 | * | 4.8 | 5 | 4.08 |
| MW27-2D | 46-48 | | 19 | 19 | 0.00 |
| MW17-1D | 9-10.5 | | 0.2 | 0.2 | 0.00 |
| MW17-2D | 10 | | 0.2 | 0.2 | 0.00 |
| MW17-2D | 68-70 | * | 4.7 | 5 | 6.19 |
| MW05-2S | 12-14 | | 0.2 | 0.2 | 0.00 |
| MW27-3I | 28-30 | | 2.8 | 3.9 | 32.84 |
| MW05-3D | 35-37 | | 0.2 | 0.2 | 0.00 |
| MW05-3D | 53-55 | * | 4.3 | 4.9 | 13.04 |
| MW19-1D | 38-40 | | 0.2 | 0.2 | 0.00 |
| P318 | 45-50 | | 8.5 | 8.5 | 0.00 |
| MW33-1D | 13-15 | | 0.2 | 0.2 | 0.00 |
| MW33-1D | 31-33 | * | 5.4 | 5.3 | 1.87 |
| MW34-1D | 11-13 | | 0.2 | 0.2 | 0.00 |
| MW35-1D | 46-48 | * | 4.6 | 4.9 | 6.32 |
| 14-553-M | 8.3-18.3 | | 0.2 | 0.2 | 0.00 |
| MW23-2S | 8.25-12.95 | | 0.2 | 0.2 | 0.00 |
| MW22-3S | 6.6-16.5 | | 0.2 | 0.2 | 0.00 |
| MW26-2I | 36.5-41.3 | | 0.2 | 0.2 | 0.00 |
| MW28-4I | 28-33 | | 0.2 | 0.2 | 0.00 |
| MW36-1D | 23-25 | | 0.2 | 0.2 | 0.00 |
| MW36-1D | 70-72 | * | 5.1 | 5.1 | 0.00 |
| MW21-3S | 8.9-18.9 | | 0.5 | 0.5 | 0.00 |
| SB66 | 23-25 | | 1.8 | 1.8 | 0.00 |
| SB66 | 33-35 | * | 3.4 | 4.1 | 18.67 |
| MW38-1I | 23-25 | | 0.18 | 0.19 | 5.41 |
| MW39-1D | 23-25 | | 1.8 | 1.9 | 5.41 |
| MW39-1D | 103-105 | * | 5.5 | 4.6 | 17.82 |

**APPENDIX B**
**Data Sheets for Relative Percent Difference Calculations--Soil**

| FEILD ANALYTICAL DUPLICATE RESULTS FOR BENZENE IN SOILS | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per kilogram) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW04-1S | 15 | * | 6 | 5.3 | 12.39 |
| MW13-1I | 20 | | 1 | 1 | 0.00 |
| MW13-2B | 135 | * | 41.6 | 43.4 | 4.24 |
| MW13-2B | 175.5-178 | | 1 | 1.1 | 9.52 |
| MW13-2B | 201-201.5 | * | 40 | 36 | 10.53 |
| MW16-1D | 5 | * | 47 | 45 | 4.35 |
| MW17-1D | 0 | | 1 | 1 | 0.00 |
| MW17-2D | 9-10 | | 1 | 1 | 0.00 |
| MW17-2D | 30 | * | 170 | 170 | 0.00 |
| MW17-2D | 97-98 | * | 190 | 170 | 11.11 |
| MW19-1D | 0 | | 1 | 1 | 0.00 |
| MW19-1D | 10 | | 1.2 | 1.2 | 0.00 |
| MW19-1D | 20 | * | 154 | 128 | 18.44 |
| MW19-1D | 25 | | 1 | 1 | 0.00 |
| MW21-1D | 0 | | 61 | 55 | 10.34 |
| MW21-1D | 5 | * | 250 | 280 | 11.32 |
| MW22-1D | 15 | | 1 | 1 | 0.00 |
| MW24-1D | 25 | * | 170 | 150 | 12.50 |
| MW25-2I | 35-37 | * | 207 | 238 | 13.93 |
| MW26-2I | 39 | | 1 | 1 | 0.00 |
| MW26-2I | 39 | * | 37 | 35 | 5.56 |
| MW27-1B | 129-130 | * | 130 | 150 | 14.29 |
| MW27-1B | 206-207 | | 1 | 1 | 0.00 |
| MW27-1B | 42-43 | | 1 | 1 | 0.00 |
| MW27-2D | 15 | | 1 | 1 | 0.00 |
| MW27-2D | 48 | | 1 | 1 | 0.00 |
| MW27-2D | 62-63 | | 1 | 1 | 0.00 |
| MW27-3I | 46 | | 1 | 1 | 0.00 |
| MW28-1B | 160-160.5 | * | 35.7 | 36.4 | 1.94 |
| MW28-1B | 160-160.5 | | 1 | 1 | 0.00 |
| MW28-1B | 19.5-20 | | 59 | 83 | 33.80 |
| MW28-1B | 247.5-248 | | 1 | 1 | 0.00 |
| MW28-1B | 81-81.5 | * | 25.3 | 26.6 | 5.01 |
| MW28-1D | 25 | | 48 | 58 | 18.87 |
| MW29-1D | 32-33 | | 6.2 | 5.8 | 6.67 |
| MW33-1D | 0 | * | 164 | 165 | 0.61 |
| MW33-1D | 10 | | 1 | 1 | 0.00 |
| MW34-1D | 0 | | 1 | 1 | 0.00 |
| MW34-1D | 5 | * | 151 | 162 | 7.03 |
| MW35-1D | 5 | * | 242 | 267 | 9.82 |
| MW35-1D | 20 | | 1 | 1 | 0.00 |
| MW35-1D | 41-42 | | 1 | 1 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| MW36-1D | 5 | * | 248 | 241 | 2.86 |
| MW36-1D | 25 | | 1 | 1 | 0.00 |
| MW36-2I | 53 | * | 220 | 213 | 3.23 |
| MW37-1D | 35 | | 1 | 1 | 0.00 |
| MW38-1I | 20 | | 1 | 1 | 0.00 |
| MW38-1I | 43 | | 1 | 1 | 0.00 |
| MW39-1D | 10 | | 1 | 1 | 0.00 |
| MW39-1D | 125 | * | 77 | 85 | 9.88 |
| PZ14 | 10 | | 1 | 1 | 0.00 |
| PZ15 | 10 | | 1 | 1 | 0.00 |
| PZ32 | 0 | * | 4.8 | 6.4 | 28.57 |
| SB03 | 0 | | 1 | 1 | 0.00 |
| SB03 | 15 | * | 1.4 | 3.7 | 90.20 |
| SB05 | 5 | | 1.5 | 1 | 40.00 |
| SB06 | 10 | | 1 | 1 | 0.00 |
| SB09 | 10 | | 1 | 1 | 0.00 |
| SB10 | 5 | | 1.4 | 1.4 | 0.00 |
| SB11 | 5 | | 1 | 1 | 0.00 |
| SB12 | 15 | * | 3.8 | 2 | 62.07 |
| SB14 | 5 | | 1 | 1 | 0.00 |
| SB16 | 10 | | 1 | 1 | 0.00 |
| SB19 | 10 | | 1 | 1 | 0.00 |
| SB21 | 10 | | 1 | 1 | 0.00 |
| SB23 | 20 | | 2.4 | 2.4 | 0.00 |
| SB24 | 15 | | 1 | 1 | 0.00 |
| SB26 | 13 | | 1 | 1 | 0.00 |
| SB28 | 0.5 | | 1 | 1 | 0.00 |
| SB28 | 51 | * | 123 | 139 | 12.21 |
| SB32 | 5 | | 1 | 1 | 0.00 |
| SB32 | 46 | * | 1 | 124 | 196.80 |
| SB33 | 15 | * | 99 | 123 | 21.62 |
| SB33 | 35 | | 1 | 1 | 0.00 |
| SB33 | 48 | * | 168 | 147 | 13.33 |
| SB34 | 25 | | 1 | 1 | 0.00 |
| SB34 | 43 | | 1 | 1 | 0.00 |
| SB34 | 45 | * | 152 | 167 | 9.40 |
| SB35 | 35 | | 1 | 1 | 0.00 |
| SB35 | 40 | | 1 | 1 | 0.00 |
| SB36 | 5 | * | 177 | 158 | 11.34 |
| SB36 | 10 | | 1 | 1 | 0.00 |
| SB37 | 5 | * | 202 | 166 | 19.57 |
| SB37 | 10 | | 1.1 | 1.1 | 0.00 |
| SB38 | 5 | * | 224 | 214 | 4.57 |
| SB38 | 25 | | 1 | 1 | 0.00 |
| SB38 | 34 | | 1 | 1 | 0.00 |
| SB38 | 55 | * | 172 | 177 | 2.87 |
| SB39 | 0 | * | 204 | 181 | 11.95 |
| SB39 | 10 | | 1 | 1 | 0.00 |
| SB39 | 20 | | 1 | 1 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| SB39 | 55 | | 1 | 1 | 0.00 |
| SB40 | 21 | | 1 | 1 | 0.00 |
| SB40 | 30 | | 1 | 1 | 0.00 |
| SB40 | 60 | * | 193 | 217 | 11.71 |
| SB40 | 65 | * | 208 | 184 | 12.24 |
| SB40 | 70 | | 1 | 1 | 0.00 |
| SB41 | 0 | * | 248 | 245 | 1.22 |
| SB41 | 5 | | 1 | 1 | 0.00 |
| SB41 | 55 | | 1 | 1 | 0.00 |
| SB42 | 5 | | 2.2 | 1.9 | 14.63 |
| SB42 | 35 | | 30 | 37 | 20.90 |
| SB42 | 55 | * | 172 | 210 | 19.90 |
| SB43 | 0 | * | 280 | 261 | 7.02 |
| SB43 | 5 | | 1.8 | 1.8 | 0.00 |
| SB43 | 55 | | 1 | 1 | 0.00 |
| SB44 | 35 | | 1 | 1 | 0.00 |
| SB44 | 45 | | 1 | 1 | 0.00 |
| SB45 | 5 | | 1 | 1 | 0.00 |
| SB45 | 10 | | 1 | 1 | 0.00 |
| SB45 | 35 | | 1 | 1 | 0.00 |
| SB45 | 55 | * | 157 | 128 | 20.35 |
| SB46 | 20 | | 1 | 1 | 0.00 |
| SB46 | 44 | | 1 | 1 | 0.00 |
| SB47 | 10 | * | 232 | 246 | 5.86 |
| SB47 | 45 | | 1 | 1 | 0.00 |
| SB48 | 0 | | 1 | 1 | 0.00 |
| SB48 | 10 | | 1 | 1 | 0.00 |
| SB48 | 52 | | 1 | 1 | 0.00 |
| SB48 | 53 | * | 145 | 155 | 6.67 |
| SB49 | 35 | | 1 | 1 | 0.00 |
| SB49 | 45 | | 1 | 1 | 0.00 |
| SB50 | 30 | * | 225 | 186 | 18.98 |
| SB50 | 55 | | 1 | 1 | 0.00 |
| SB51 | 35 | | 1 | 1 | 0.00 |
| SB51 | 65 | | 1 | 1 | 0.00 |
| SB52 | 35 | | 1 | 1 | 0.00 |
| SB52 | 50 | | 1 | 1 | 0.00 |
| SB53 | 30 | | 1 | 1 | 0.00 |
| SB53 | 50 | | 1 | 1 | 0.00 |
| SB53 | 80 | * | 159 | 153 | 3.85 |
| SB54 | 25 | | 1 | 1 | 0.00 |
| SB54 | 35 | | 1 | 1 | 0.00 |
| SB54 | 80 | * | 155 | 121 | 24.64 |
| SB54 | 85 | * | 139 | 185 | 28.40 |
| SB54 | 90 | | 1 | 1 | 0.00 |
| SB56 | 20 | | 1 | 1 | 0.00 |
| SB56 | 55 | | 1 | 1 | 0.00 |
| SB56 | 55 | * | 172 | 193 | 11.51 |
| SB56 | 85 | * | 167 | 153 | 8.75 |

| | | | | | |
|---|---|---|---|---|---|
| SB57 | 40 | | 1 | 1 | 0.00 |
| SB57 | 50 | | 1 | 1 | 0.00 |
| SB57 | 50 | * | 200 | 192 | 4.08 |
| SB57 | 65 | | 1 | 1 | 0.00 |
| SB58 | 5 | | 1.6 | 1.5 | 6.45 |
| SB58 | 35 | | 1 | 1 | 0.00 |
| SB58 | 65 | | 1 | 1 | 0.00 |
| SB58 | 80 | * | 228 | 210 | 8.22 |
| SB59 | 30 | | 1 | 1 | 0.00 |
| SB59 | 55 | | 1 | 1 | 0.00 |
| SB59 | 60 | | 1 | 1 | 0.00 |
| SB59 | 95 | * | 300 | 295 | 1.68 |
| SB60 | 20 | | 1 | 1 | 0.00 |
| SB60 | 25 | | 1 | 1 | 0.00 |
| SB60 | 30 | | 1 | 1 | 0.00 |
| SB60 | 70 | * | 218 | 241 | 10.02 |
| SB61 | 25 | | 1 | 1 | 0.00 |
| SB61 | 50 | | 1 | 1 | 0.00 |
| SB61 | 80 | * | 222 | 213 | 4.14 |
| SB62 | 60 | * | 196 | 202 | 3.02 |
| SB62 | 65 | | 1 | 1 | 0.00 |
| SB62 | 90 | | 1 | 1 | 0.00 |
| SB63 | 35 | | 1 | 1 | 0.00 |
| SB63 | 50 | | 1 | 1 | 0.00 |
| SB63 | 70 | | 1 | 1 | 0.00 |
| SB63 | 80 | * | 191 | 172 | 10.47 |
| SB63 | 90 | | 1 | 1 | 0.00 |
| SB64 | 5 | | 3.9 | 2.4 | 47.62 |
| SB64 | 45 | | 1 | 1 | 0.00 |
| SB65 | 40 | | 1 | 1 | 0.00 |
| SB65 | 45 | | 1 | 1 | 0.00 |
| SB65 | 85 | * | 183 | 195 | 6.35 |
| SB66 | 15 | * | 116 | 131 | 12.15 |
| SB66 | 35 | | 1 | 1 | 0.00 |
| SB66 | 40 | | 1 | 1 | 0.00 |
| SB67 | 11 | * | 100 | 100 | 0.00 |
| SB67 | 25 | | 1 | 1 | 0.00 |
| SB67 | 45 | | 1 | 1 | 0.00 |
| SB67 | 65 | | 1 | 1 | 0.00 |
| SB68 | 55 | * | 78 | 75 | 3.92 |
| SB69 | 0 | * | 97 | 86.4 | 11.56 |
| SB69 | 30 | | 1 | 1 | 0.00 |
| SB69 | 45 | | 1 | 1 | 0.00 |
| SB70 | 40 | * | 76 | 91 | 17.96 |
| SB70 | 45 | | 1 | 1 | 0.00 |
| SB70 | 65 | | 1 | 1 | 0.00 |
| SB71 | 25 | | 3.9 | 2.3 | 51.61 |
| SB71 | 45 | | 1 | 1 | 0.00 |
| SB71 | 55 | * | 41 | 61 | 39.22 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB72 | | 45 | | * | | 84 | | 70 | | 18.18 |
| SB72 | | 75 | | * | | 55 | | 63 | | 13.56 |
| SB73 | | 15 | | | | 1 | | 1 | | 0.00 |
| SB73 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB73 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB74 | | 15 | | | | 1 | | 2.9 | | 97.44 |
| SB74 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB74 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 10 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 15 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 60 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 65 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 80 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 25 | | | | 1 | | 1.4 | | 33.33 |
| SB77 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 50 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 55 | | | | 1 | | 1 | | 0.00 |

| FEILD ANALYTICAL DUPLICATE RESULTS FOR TOLUENE IN SOILS | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per kilogram) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW04-1S | 15 | * | 5.9 | 5.8 | 1.71 |
| MW13-1I | 20 | | 1 | 1 | 0.00 |
| MW13-2B | 135 | * | 40.2 | 43.2 | 7.19 |
| MW13-2B | 175.5-178 | | 1 | 1 | 0.00 |
| MW13-2B | 201-201.5 | * | 38 | 37 | 2.67 |
| MW16-1D | 5 | * | 43 | 45 | 4.55 |
| MW17-1D | 0 | | 1 | 1 | 0.00 |
| MW17-2D | 9-10 | | 3.1 | 2.9 | 6.67 |
| MW17-2D | 30 | * | 180 | 180 | 0.00 |
| MW17-2D | 97-98 | * | 160 | 170 | 6.06 |
| MW19-1D | 0 | | 1 | 1 | 0.00 |
| MW19-1D | 10 | | 4.3 | 4.3 | 0.00 |
| MW19-1D | 20 | * | 132 | 107 | 20.92 |
| MW19-1D | 25 | | 1 | 1 | 0.00 |
| MW21-1D | 0 | | 9.5 | 15 | 44.90 |
| MW21-1D | 5 | * | 132 | 165 | 22.22 |
| MW22-1D | 15 | | 1 | 1 | 0.00 |
| MW24-1D | 25 | * | 140 | 150 | 6.90 |
| MW25-2I | 35-37 | * | 179 | 203 | 12.57 |
| MW26-2I | 39 | | 1 | 1 | 0.00 |
| MW26-2I | 39 | * | 40 | 33 | 19.18 |
| MW27-1B | 129-130 | * | 100 | 140 | 33.33 |
| MW27-1B | 206-207 | | 1.4 | 1.1 | 24.00 |
| MW27-1B | 42-43 | | 1 | 1.1 | 9.52 |
| MW27-2D | 15 | | 4.8 | 4.5 | 6.45 |
| MW27-2D | 48 | | 1 | 1 | 0.00 |
| MW27-2D | 62-63 | | 1 | 1 | 0.00 |
| MW27-3I | 46 | | 1 | 1 | 0.00 |
| MW28-1B | 160-160.5 | * | 29.3 | 31.6 | 7.55 |
| MW28-1B | 160-160.5 | | 1.5 | 1.5 | 0.00 |
| MW28-1B | 19.5-20 | | 14 | 9 | 43.48 |
| MW28-1B | 247.5-248 | | 1 | 1 | 0.00 |
| MW28-1B | 81-81.5 | * | 20 | 23 | 13.95 |
| MW28-1D | 25 | | 1 | 1 | 0.00 |
| MW29-1D | 32-33 | | 2.3 | 4.2 | 58.46 |
| MW33-1D | 0 | * | 150 | 151 | 0.66 |
| MW33-1D | 10 | | 2.7 | 2.3 | 16.00 |
| MW34-1D | 0 | | 1 | 1 | 0.00 |
| MW34-1D | 5 | * | 133 | 132 | 0.75 |
| MW35-1D | 5 | * | 200 | 244 | 19.82 |
| MW35-1D | 20 | | 1 | 1 | 0.00 |
| MW35-1D | 41-42 | | 1 | 1 | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| MW36-1D | | 5 | | * | | 256 | | 235 | | 8.55 |
| MW36-1D | | 25 | | | | 1 | | 1 | | 0.00 |
| MW36-2I | | 53 | | * | | 206 | | 195 | | 5.49 |
| MW37-1D | | 35 | | | | 1 | | 1 | | 0.00 |
| MW38-1I | | 20 | | | | 1 | | 1 | | 0.00 |
| MW38-1I | | 43 | | | | 1 | | 1 | | 0.00 |
| MW39-1D | | 10 | | | | 1 | | 1 | | 0.00 |
| MW39-1D | | 125 | | * | | 58 | | 76 | | 26.87 |
| PZ14 | | 10 | | | | 1.8 | | 1.9 | | 5.41 |
| PZ15 | | 10 | | | | 1 | | 1 | | 0.00 |
| PZ32 | | 0 | | * | | 5 | | 6.9 | | 31.93 |
| SB03 | | 0 | | | | 1 | | 1 | | 0.00 |
| SB03 | | 15 | | * | | 1.8 | | 3 | | 50.00 |
| SB05 | | 5 | | | | 7 | | 4.6 | | 41.38 |
| SB06 | | 10 | | | | 1.2 | | 1 | | 18.18 |
| SB09 | | 10 | | | | 1 | | 1 | | 0.00 |
| SB10 | | 5 | | | | 7.7 | | 7 | | 9.52 |
| SB11 | | 5 | | | | 1.7 | | 1.5 | | 12.50 |
| SB12 | | 15 | | * | | 4.5 | | 2.8 | | 46.58 |
| SB14 | | 5 | | | | 1.9 | | 1.9 | | 0.00 |
| SB16 | | 10 | | | | 2.1 | | 2.3 | | 9.09 |
| SB19 | | 10 | | | | 1 | | 1 | | 0.00 |
| SB21 | | 10 | | | | 1.3 | | 1.2 | | 8.00 |
| SB23 | | 20 | | | | 1 | | 1 | | 0.00 |
| SB24 | | 15 | | | | 1 | | 1 | | 0.00 |
| SB26 | | 13 | | | | 1 | | 1 | | 0.00 |
| SB28 | | 0.5 | | | | 1 | | 1 | | 0.00 |
| SB28 | | 51 | | * | | 110 | | 109 | | 0.91 |
| SB32 | | 5 | | | | 4.2 | | 4.6 | | 9.09 |
| SB32 | | 46 | | * | | 1 | | 110 | | 196.40 |
| SB33 | | 15 | | * | | 95 | | 117 | | 20.75 |
| SB33 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB33 | | 48 | | * | | 158 | | 137 | | 14.24 |
| SB34 | | 25 | | | | 1 | | 1 | | 0.00 |
| SB34 | | 43 | | | | 1 | | 1 | | 0.00 |
| SB34 | | 45 | | * | | 108 | | 132 | | 20.00 |
| SB35 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB35 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB36 | | 5 | | * | | 158 | | 142 | | 10.67 |
| SB36 | | 10 | | | | 1 | | 1 | | 0.00 |
| SB37 | | 5 | | * | | 170 | | 136 | | 22.22 |
| SB37 | | 10 | | | | 2.2 | | 2.4 | | 8.70 |
| SB38 | | 5 | | * | | 191 | | 186 | | 2.65 |
| SB38 | | 25 | | | | 1.5 | | 1.6 | | 6.45 |
| SB38 | | 34 | | | | 1 | | 1 | | 0.00 |
| SB38 | | 55 | | * | | 130 | | 135 | | 3.77 |
| SB39 | | 0 | | * | | 194 | | 176 | | 9.73 |
| SB39 | | 10 | | | | 1 | | 1 | | 0.00 |
| SB39 | | 20 | | | | 1 | | 1 | | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB39 | | 55 | | | | 1 | | 1 | | 0.00 |
| SB40 | | 21 | | | | 1 | | 1 | | 0.00 |
| SB40 | | 30 | | | | 1 | | 1 | | 0.00 |
| SB40 | | 50 | | * | | 179 | | 177 | | 1.12 |
| SB40 | | 65 | | * | | 168 | | 151 | | 10.66 |
| SB40 | | 70 | | | | 1 | | 1 | | 0.00 |
| SB41 | | 0 | | * | | 198 | | 208 | | 4.93 |
| SB41 | | 5 | | | | 3.2 | | 3 | | 6.45 |
| SB41 | | 55 | | | | 1 | | 1 | | 0.00 |
| SB42 | | 5 | | | | 5 | | 4.8 | | 4.08 |
| SB42 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB42 | | 55 | | * | | 168 | | 204 | | 19.35 |
| SB43 | | 0 | | * | | 242 | | 226 | | 6.84 |
| SB43 | | 5 | | | | 6.4 | | 5.7 | | 11.57 |
| SB43 | | 55 | | | | 1 | | 1 | | 0.00 |
| SB44 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB44 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB45 | | 5 | | | | 1 | | 1 | | 0.00 |
| SB45 | | 10 | | | | 1 | | 1 | | 0.00 |
| SB45 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB45 | | 55 | | * | | 105 | | 85 | | 21.05 |
| SB46 | | 20 | | | | 1 | | 1 | | 0.00 |
| SB46 | | 44 | | | | 1 | | 1 | | 0.00 |
| SB47 | | 10 | | * | | 205 | | 207 | | 0.97 |
| SB47 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB48 | | 0 | | | | 1 | | 1 | | 0.00 |
| SB48 | | 10 | | | | 1.7 | | 1.4 | | 19.35 |
| SB48 | | 52 | | | | 1 | | 1 | | 0.00 |
| SB48 | | 53 | | * | | 114 | | 103 | | 10.14 |
| SB49 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB49 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB50 | | 30 | | * | | 197 | | 158 | | 21.97 |
| SB50 | | 55 | | | | 1 | | 1 | | 0.00 |
| SB51 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB51 | | 65 | | | | 1 | | 1.6 | | 46.15 |
| SB52 | | 35 | | | | 1.4 | | 1.7 | | 19.35 |
| SB52 | | 50 | | | | 1 | | 1 | | 0.00 |
| SB53 | | 30 | | | | 1 | | 1 | | 0.00 |
| SB53 | | 50 | | | | 1 | | 1 | | 0.00 |
| SB53 | | 80 | | * | | 133 | | 135 | | 1.49 |
| SB54 | | 25 | | | | 1 | | 1 | | 0.00 |
| SB54 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB54 | | 80 | | * | | 131 | | 103 | | 23.93 |
| SB54 | | 85 | | * | | 116 | | 162 | | 33.09 |
| SB54 | | 90 | | | | 1 | | 1 | | 0.00 |
| SB56 | | 20 | | | | 1 | | 1 | | 0.00 |
| SB56 | | 55 | | | | 1 | | 1 | | 0.00 |
| SB56 | | 55 | | * | | 168 | | 190 | | 12.29 |
| SB56 | | 85 | | * | | 155 | | 147 | | 5.30 |

| | | | | | |
|---|---|---|---|---|---|
| SB57 | 40 | | 1 | 1 | 0.00 |
| SB57 | 50 | | 1 | 1 | 0.00 |
| SB57 | 50 | * | 203 | 188 | 7.67 |
| SB57 | 65 | | 1 | 1 | 0.00 |
| SB58 | 5 | | 6.7 | 5.7 | 16.13 |
| SB58 | 35 | | 1 | 1 | 0.00 |
| SB58 | 65 | | 1 | 1 | 0.00 |
| SB58 | 80 | * | 220 | 218 | 0.91 |
| SB59 | 30 | | 1 | 1 | 0.00 |
| SB59 | 55 | | 1 | 1.1 | 9.52 |
| SB59 | 60 | | 1 | 1 | 0.00 |
| SB59 | 95 | * | 285 | 289 | 1.39 |
| SB60 | 20 | | 1.4 | 1.5 | 6.90 |
| SB60 | 25 | | 1.1 | 1.2 | 8.70 |
| SB60 | 30 | | 1 | 1 | 0.00 |
| SB60 | 70 | * | 191 | 212 | 10.42 |
| SB61 | 25 | | 1 | 1 | 0.00 |
| SB61 | 50 | | 1 | 1 | 0.00 |
| SB61 | 80 | * | 215 | 212 | 1.41 |
| SB62 | 60 | * | 191 | 200 | 4.60 |
| SB62 | 65 | | 1 | 1 | 0.00 |
| SB62 | 90 | | 1 | 1 | 0.00 |
| SB63 | 35 | | 1 | 1 | 0.00 |
| SB63 | 50 | | 1 | 1 | 0.00 |
| SB63 | 70 | | 1.7 | 1.6 | 6.06 |
| SB63 | 80 | * | 181 | 174 | 3.94 |
| SB63 | 90 | | 1 | 1 | 0.00 |
| SB64 | 5 | | 7.6 | 7.6 | 0.00 |
| SB64 | 45 | | 1 | 1.2 | 18.18 |
| SB65 | 40 | | 1 | 1 | 0.00 |
| SB65 | 45 | | 1 | 1 | 0.00 |
| SB65 | 85 | * | 173 | 182 | 5.07 |
| SB66 | 15 | * | 104 | 116 | 10.91 |
| SB66 | 35 | | 1 | 1 | 0.00 |
| SB66 | 40 | | 1 | 1 | 0.00 |
| SB67 | 11 | * | 96 | 96 | 0.00 |
| SB67 | 25 | | 1 | 1 | 0.00 |
| SB67 | 45 | | 1 | 1 | 0.00 |
| SB67 | 65 | | 1 | 1 | 0.00 |
| SB68 | 55 | * | 82 | 76 | 7.59 |
| SB69 | 0 | * | 91.2 | 78.1 | 15.48 |
| SB69 | 30 | | 1 | 1 | 0.00 |
| SB69 | 45 | | 1 | 1 | 0.00 |
| SB70 | 40 | * | 78 | 92 | 16.47 |
| SB70 | 45 | | 1 | 1 | 0.00 |
| SB70 | 65 | | 1.2 | 1.2 | 0.00 |
| SB71 | 25 | | 14 | 10 | 33.33 |
| SB71 | 45 | | 2.5 | 2.6 | 3.92 |
| SB71 | 55 | * | 40 | 59 | 38.38 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB72 | | 45 | | * | | 76 | | 64 | | 17.14 |
| SB72 | | 75 | | * | | 51 | | 60 | | 16.22 |
| SB73 | | 15 | | | | 1 | | 1 | | 0.00 |
| SB73 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB73 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB74 | | 15 | | | | 2.9 | | 3.8 | | 26.87 |
| SB74 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB74 | | 40 | | | | 1 | | 1.1 | | 9.52 |
| SB76 | | 10 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 15 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 60 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 65 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 80 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 25 | | | | 3.1 | | 4.9 | | 45.00 |
| SB77 | | 40 | | | | 2.2 | | 1.8 | | 20.00 |
| SB77 | | 50 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 55 | | | | 1 | | 1 | | 0.00 |

| FEILD ANALYTICAL DUPLICATE RESULTS FOR ETHYLBENZENE IN SOILS | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per kilogram) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW04-1S | 15 | * | 6.1 | 5.9 | 3.33 |
| MW13-1I | 20 | | 1 | 1 | 0.00 |
| MW13-2B | 135 | * | 36.4 | 39.2 | 7.41 |
| MW13-2B | 175.5-178 | | 1 | 1 | 0.00 |
| MW13-2B | 201-201.5 | * | 40 | 42 | 4.88 |
| MW16-1D | 5 | * | 40 | 43 | 7.23 |
| MW17-1D | 0 | | 1 | 1 | 0.00 |
| MW17-2D | 9-10 | | 1 | 1 | 0.00 |
| MW17-2D | 30 | * | 200 | 220 | 9.52 |
| MW17-2D | 97-98 | * | 130 | 160 | 20.69 |
| MW19-1D | 0 | | 1 | 1 | 0.00 |
| MW19-1D | 10 | | 1 | 1 | 0.00 |
| MW19-1D | 20 | * | 137 | 105 | 26.45 |
| MW19-1D | 25 | | 1 | 1 | 0.00 |
| MW21-1D | 0 | | 74 | 76 | 2.67 |
| MW21-1D | 5 | * | 172 | 181 | 5.10 |
| MW22-1D | 15 | | 1 | 1 | 0.00 |
| MW24-1D | 25 | * | 130 | 180 | 32.26 |
| MW25-2I | 35-37 | * | 221 | 195 | 12.50 |
| MW26-2I | 39 | | 1 | 1 | 0.00 |
| MW26-2I | 39 | * | 42 | 33 | 24.00 |
| MW27-1B | 129-130 | * | 100 | 160 | 46.15 |
| MW27-1B | 206-207 | | 1 | 1 | 0.00 |
| MW27-1B | 42-43 | | 1 | 1 | 0.00 |
| MW27-2D | 15 | | 1 | 1 | 0.00 |
| MW27-2D | 48 | | 1 | 1 | 0.00 |
| MW27-2D | 62-63 | | 1 | 1 | 0.00 |
| MW27-3I | 46 | | 1 | 1 | 0.00 |
| MW28-1B | 160-160.5 | * | 29.3 | 31.6 | 7.55 |
| MW28-1B | 160-160.5 | | 1 | 1 | 0.00 |
| MW28-1B | 19.5-20 | | 1 | 1 | 0.00 |
| MW28-1B | 247.5-248 | | 1 | 1 | 0.00 |
| MW28-1B | 81-81.5 | * | 14.5 | 19 | 26.87 |
| MW28-1D | 25 | | 1 | 1 | 0.00 |
| MW29-1D | 32-33 | | 1 | 1 | 0.00 |
| MW33-1D | 0 | * | 175 | 171 | 2.31 |
| MW33-1D | 10 | | 1 | 1 | 0.00 |
| MW34-1D | 0 | | 1 | 1 | 0.00 |
| MW34-1D | 5 | * | 144 | 116 | 21.54 |
| MW35-1D | 5 | * | 213 | 299 | 33.59 |
| MW35-1D | 20 | | 1 | 1 | 0.00 |
| MW35-1D | 41-42 | | 1 | 1 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| MW36-1D | 5 | * | 249 | 226 | 9.68 |
| MW36-1D | 25 | | 1 | 1 | 0.00 |
| MW36-2I | 53 | * | 186 | 168 | 10.17 |
| MW37-1D | 35 | | 1 | 1 | 0.00 |
| MW38-1I | 20 | | 1 | 1 | 0.00 |
| MW38-1I | 43 | | 1 | 1 | 0.00 |
| MW39-1D | 10 | | 1 | 1 | 0.00 |
| MW39-1D | 125 | * | 51 | 65 | 24.14 |
| PZ14 | 10 | | 1 | 1 | 0.00 |
| PZ15 | 10 | | 1 | 1 | 0.00 |
| PZ32 | 0 | * | 5.9 | 8.7 | 38.36 |
| SB03 | 0 | | 1 | 1 | 0.00 |
| SB03 | 15 | * | 1.6 | 3.9 | 83.64 |
| SB05 | 5 | | 3 | 2.6 | 14.29 |
| SB06 | 10 | | 1 | 1 | 0.00 |
| SB09 | 10 | | 1 | 1 | 0.00 |
| SB10 | 5 | | 6.4 | 6.7 | 4.58 |
| SB11 | 5 | | 1.3 | 1 | 26.09 |
| SB12 | 15 | * | 4.8 | 2.6 | 59.46 |
| SB14 | 5 | | 2 | 2.1 | 4.88 |
| SB16 | 10 | | 1 | 1.3 | 26.09 |
| SB19 | 10 | | 1 | 1 | 0.00 |
| SB21 | 10 | | 1 | 1 | 0.00 |
| SB23 | 20 | | 1 | 1 | 0.00 |
| SB24 | 15 | | 1 | 1 | 0.00 |
| SB26 | 13 | | 1 | 1 | 0.00 |
| SB28 | 0.5 | | 1 | 1 | 0.00 |
| SB28 | 51 | * | 91 | 95 | 4.30 |
| SB32 | 5 | | 1 | 1 | 0.00 |
| SB32 | 46 | * | 1 | 117 | 196.61 |
| SB33 | 15 | * | 114 | 102 | 11.11 |
| SB33 | 35 | | 1 | 1 | 0.00 |
| SB33 | 48 | * | 139 | 122 | 13.03 |
| SB34 | 25 | | 1 | 1 | 0.00 |
| SB34 | 43 | | 1 | 1 | 0.00 |
| SB34 | 45 | * | 99 | 113 | 13.21 |
| SB35 | 35 | | 1 | 1 | 0.00 |
| SB35 | 40 | | 1 | 1 | 0.00 |
| SB36 | 5 | * | 149 | 137 | 8.39 |
| SB36 | 10 | | 1 | 1 | 0.00 |
| SB37 | 5 | * | 154 | 136 | 12.41 |
| SB37 | 10 | | 1 | 1 | 0.00 |
| SB38 | 5 | * | 185 | 174 | 6.13 |
| SB38 | 25 | | 1 | 1 | 0.00 |
| SB38 | 34 | | 1 | 1 | 0.00 |
| SB38 | 55 | * | 108 | 126 | 15.38 |
| SB39 | 0 | * | 185 | 185 | 0.00 |
| SB39 | 10 | | 1 | 1 | 0.00 |
| SB39 | 20 | | 1 | 1 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| SB39 | 55 | | 1 | 1 | 0.00 |
| SB40 | 21 | | 1 | 1 | 0.00 |
| SB40 | 30 | | 1 | 1 | 0.00 |
| SB40 | 50 | * | 176 | 155 | 12.69 |
| SB40 | 65 | * | 152 | 133 | 13.33 |
| SB40 | 70 | | 1 | 1 | 0.00 |
| SB41 | 0 | * | 174 | 191 | 9.32 |
| SB41 | 5 | | 1 | 2 | 66.67 |
| SB41 | 55 | | 1 | 1 | 0.00 |
| SB42 | 5 | | 1 | 1 | 0.00 |
| SB42 | 35 | | 1 | 1 | 0.00 |
| SB42 | 55 | * | 158 | 213 | 29.65 |
| SB43 | 0 | * | 224 | 210 | 6.45 |
| SB43 | 5 | | 1 | 1 | 0.00 |
| SB43 | 55 | | 1 | 1 | 0.00 |
| SB44 | 35 | | 1 | 1 | 0.00 |
| SB44 | 45 | | 1 | 1 | 0.00 |
| SB45 | 5 | | 1 | 1 | 0.00 |
| SB45 | 10 | | 1 | 1 | 0.00 |
| SB45 | 35 | | 1 | 1 | 0.00 |
| SB45 | 55 | * | 105 | 85 | 21.05 |
| SB46 | 20 | | 1 | 1 | 0.00 |
| SB46 | 44 | | 1 | 1 | 0.00 |
| SB47 | 10 | * | 256 | 231 | 10.27 |
| SB47 | 45 | | 1 | 1 | 0.00 |
| SB48 | 0 | | 1 | 1 | 0.00 |
| SB48 | 10 | | 1 | 1 | 0.00 |
| SB48 | 52 | | 1 | 1 | 0.00 |
| SB48 | 53 | * | 98 | 87 | 11.89 |
| SB49 | 35 | | 1 | 1 | 0.00 |
| SB49 | 45 | | 1 | 1 | 0.00 |
| SB50 | 30 | * | 221 | 154 | 35.73 |
| SB50 | 55 | | 1 | 1 | 0.00 |
| SB51 | 35 | | 1 | 1 | 0.00 |
| SB51 | 65 | | 1 | 1 | 0.00 |
| SB52 | 35 | | 1 | 1 | 0.00 |
| SB52 | 50 | | 1 | 1 | 0.00 |
| SB53 | 30 | | 1 | 1 | 0.00 |
| SB53 | 50 | | 1 | 1 | 0.00 |
| SB53 | 80 | * | 117 | 128 | 8.98 |
| SB54 | 25 | | 1 | 1 | 0.00 |
| SB54 | 35 | | 1 | 1 | 0.00 |
| SB54 | 80 | * | 115 | 83 | 32.32 |
| SB54 | 85 | * | 99 | 131 | 27.83 |
| SB54 | 90 | | 1 | 1 | 0.00 |
| SB56 | 20 | | 1 | 1 | 0.00 |
| SB56 | 55 | | 1 | 1 | 0.00 |
| SB56 | 55 | * | 164 | 181 | 9.86 |
| SB56 | 85 | * | 154 | 132 | 15.38 |

| | | | | | |
|---|---|---|---|---|---|
| SB57 | 40 | | 1 | 1 | 0.00 |
| SB57 | 50 | | 1 | 1 | 0.00 |
| SB57 | 50 | * | 194 | 175 | 10.30 |
| SB57 | 65 | | 1 | 1 | 0.00 |
| SB58 | 5 | | 1 | 1 | 0.00 |
| SB58 | 35 | | 1 | 1 | 0.00 |
| SB58 | 65 | | 1 | 1 | 0.00 |
| SB58 | 80 | * | 216 | 220 | 1.83 |
| SB59 | 30 | | 1 | 1 | 0.00 |
| SB59 | 55 | | 1 | 1 | 0.00 |
| SB59 | 60 | | 1 | 1 | 0.00 |
| SB59 | 95 | * | 297 | 282 | 5.18 |
| SB60 | 20 | | 1 | 1 | 0.00 |
| SB60 | 25 | | 1 | 1 | 0.00 |
| SB60 | 30 | | 1 | 1 | 0.00 |
| SB60 | 70 | * | 172 | 178 | 3.43 |
| SB61 | 25 | | 1 | 1 | 0.00 |
| SB61 | 50 | | 1 | 1 | 0.00 |
| SB61 | 80 | * | 205 | 212 | 3.36 |
| SB62 | 60 | * | 203 | 241 | 17.12 |
| SB62 | 65 | | 1 | 1 | 0.00 |
| SB62 | 90 | | 1 | 1 | 0.00 |
| SB63 | 35 | | 1 | 1 | 0.00 |
| SB63 | 50 | | 1 | 1 | 0.00 |
| SB63 | 70 | | 1 | 1 | 0.00 |
| SB63 | 80 | * | 172 | 166 | 3.55 |
| SB63 | 90 | | 1 | 1 | 0.00 |
| SB64 | 5 | | 5 | 6.9 | 31.93 |
| SB64 | 45 | | 1 | 1 | 0.00 |
| SB65 | 40 | | 1 | 1 | 0.00 |
| SB65 | 45 | | 1 | 1 | 0.00 |
| SB65 | 85 | * | 176 | 178 | 1.13 |
| SB66 | 15 | * | 149 | 109 | 31.01 |
| SB66 | 35 | | 1 | 1 | 0.00 |
| SB66 | 40 | | 1 | 1 | 0.00 |
| SB67 | 11 | * | 115 | 120 | 4.26 |
| SB67 | 25 | | 1 | 1 | 0.00 |
| SB67 | 45 | | 1 | 1 | 0.00 |
| SB67 | 65 | | 1 | 1 | 0.00 |
| SB68 | 55 | * | 99 | 92 | 7.33 |
| SB69 | 0 | * | 88.9 | 78.6 | 12.30 |
| SB69 | 30 | | 1 | 1 | 0.00 |
| SB69 | 45 | | 1 | 1 | 0.00 |
| SB70 | 40 | * | 83 | 90 | 8.09 |
| SB70 | 45 | | 1 | 1 | 0.00 |
| SB70 | 65 | | 1 | 1 | 0.00 |
| SB71 | 25 | | 8.3 | 1 | 156.99 |
| SB71 | 45 | | 1 | 1 | 0.00 |
| SB71 | 55 | * | 35 | 52 | 39.08 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB72 | | 45 | | * | | 77 | | 66 | | 15.38 |
| SB72 | | 75 | | * | | 52 | | 61 | | 15.93 |
| SB73 | | 15 | | | | 1 | | 1 | | 0.00 |
| SB73 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB73 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB74 | | 15 | | | | 1 | | 1 | | 0.00 |
| SB74 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB74 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 10 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 15 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 60 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 65 | | | | 1 | | 1 | | 0.00 |
| SB76 | | 80 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 25 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 50 | | | | 1 | | 1 | | 0.00 |
| SB77 | | 55 | | | | 1 | | 1 | | 0.00 |

| FEILD ANALYTICAL DUPLICATE RESULTS FOR XYLENE IN SOILS | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per kilogram) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW04-1S | 15 | * | 4.8 | 5.3 | 9.90 |
| MW13-1I | 20 | | 1 | 1 | 0.00 |
| MW13-2B | 135 | * | 78.6 | 78.6 | 0.00 |
| MW13-2B | 175.5-178 | | 1 | 1 | 0.00 |
| MW13-2B | 201-201.5 | * | 79 | 87 | 9.64 |
| MW16-1D | 5 | * | 76 | 84 | 10.00 |
| MW17-1D | 0 | | 1 | 1 | 0.00 |
| MW17-2D | 9-10 | | 1 | 1 | 0.00 |
| MW17-2D | 30 | * | 410 | 480 | 15.73 |
| MW17-2D | 97-98 | * | 240 | 320 | 28.57 |
| MW19-1D | 0 | | 1 | 1 | 0.00 |
| MW19-1D | 10 | | 3.4 | 3.5 | 2.90 |
| MW19-1D | 20 | * | 137 | 125 | 9.16 |
| MW19-1D | 25 | | 1 | 1 | 0.00 |
| MW21-1D | 0 | | 21 | 20 | 4.88 |
| MW21-1D | 5 | * | 382 | 380 | 0.52 |
| MW22-1D | 15 | | 1 | 1 | 0.00 |
| MW24-1D | 25 | * | 260 | 340 | 26.67 |
| MW25-2I | 35-37 | * | 329 | 315 | 4.35 |
| MW26-2I | 39 | | 1 | 1 | 0.00 |
| MW26-2I | 39 | * | 92 | 65 | 34.39 |
| MW27-1B | 129-130 | * | 210 | 330 | 44.44 |
| MW27-1B | 206-207 | | 1 | 1 | 0.00 |
| MW27-1B | 42-43 | | 1 | 1 | 0.00 |
| MW27-2D | 15 | | 4.6 | 4.4 | 4.44 |
| MW27-2D | 48 | | 1 | 1 | 0.00 |
| MW27-2D | 62-63 | | 1 | 1 | 0.00 |
| MW27-3I | 46 | | 1 | 1 | 0.00 |
| MW28-1B | 160-160.5 | * | 56.4 | 59.7 | 5.68 |
| MW28-1B | 160-160.5 | | 1 | 1 | 0.00 |
| MW28-1B | 19.5-20 | | 1 | 1 | 0.00 |
| MW28-1B | 247.5-248 | | 1 | 1 | 0.00 |
| MW28-1B | 81-81.5 | * | 25.7 | 32.5 | 23.37 |
| MW28-1D | 25 | | 1 | 1 | 0.00 |
| MW29-1D | 32-33 | | 1 | 1 | 0.00 |
| MW33-1D | 0 | * | 167 | 159 | 4.91 |
| MW33-1D | 10 | | 3.3 | 2.4 | 31.58 |
| MW34-1D | 0 | | 1 | 1 | 0.00 |
| MW34-1D | 5 | * | 130 | 94 | 32.14 |
| MW35-1D | 5 | * | 215 | 284 | 27.66 |
| MW35-1D | 20 | | 1 | 1 | 0.00 |
| MW35-1D | 41-42 | | 1 | 1 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| MW36-1D | 5 | * | 250 | 224 | 10.97 |
| MW36-1D | 25 | | 1 | 1 | 0.00 |
| MW36-2I | 53 | * | 196 | 163 | 18.38 |
| MW37-1D | 35 | | 1 | 1 | 0.00 |
| MW38-1I | 20 | | 1 | 1 | 0.00 |
| MW38-1I | 43 | | 1 | 1 | 0.00 |
| MW39-1D | 10 | | 1 | 1 | 0.00 |
| MW39-1D | 125 | * | 53 | 64 | 18.80 |
| PZ14 | 10 | | 1 | 1 | 0.00 |
| PZ15 | 10 | | 1 | 1 | 0.00 |
| PZ32 | 0 | * | 3.8 | 5.7 | 40.00 |
| SB03 | 0 | | 1 | 1 | 0.00 |
| SB03 | 15 | * | 2.4 | 3.4 | 34.48 |
| SB05 | 5 | | 5.6 | 5 | 11.32 |
| SB06 | 10 | | 1.7 | 1 | 51.85 |
| SB09 | 10 | | 1 | 1 | 0.00 |
| SB10 | 5 | | 13 | 16 | 20.69 |
| SB11 | 5 | | 2.2 | 1.5 | 37.84 |
| SB12 | 15 | * | 3.8 | 2.9 | 26.87 |
| SB14 | 5 | | 5.3 | 3 | 55.42 |
| SB16 | 10 | | 1.7 | 2.4 | 34.15 |
| SB19 | 10 | | 1 | 1 | 0.00 |
| SB21 | 10 | | 1 | 1 | 0.00 |
| SB23 | 20 | | 1 | 1 | 0.00 |
| SB24 | 15 | | 1 | 1 | 0.00 |
| SB26 | 13 | | 1 | 1 | 0.00 |
| SB28 | 0.5 | | 1 | 1 | 0.00 |
| SB28 | 51 | * | 88 | 95 | 7.65 |
| SB32 | 5 | | 3.3 | 3 | 9.52 |
| SB32 | 46 | * | 1 | 110 | 196.40 |
| SB33 | 15 | * | 105 | 97 | 7.92 |
| SB33 | 35 | | 1 | 1 | 0.00 |
| SB33 | 48 | * | 117 | 111 | 5.26 |
| SB34 | 25 | | 1 | 1 | 0.00 |
| SB34 | 43 | | 1 | 1 | 0.00 |
| SB34 | 45 | * | 100 | 102 | 1.98 |
| SB35 | 35 | | 1 | 1 | 0.00 |
| SB35 | 40 | | 1 | 1 | 0.00 |
| SB36 | 5 | * | 154 | 133 | 14.63 |
| SB36 | 10 | | 1 | 1 | 0.00 |
| SB37 | 5 | * | 132 | 132 | 0.00 |
| SB37 | 10 | | 1 | 1 | 0.00 |
| SB38 | 5 | * | 174 | 166 | 4.71 |
| SB38 | 25 | | 1 | 1 | 0.00 |
| SB38 | 34 | | 1 | 1 | 0.00 |
| SB38 | 55 | * | 107 | 129 | 18.64 |
| SB39 | 0 | * | 179 | 179 | 0.00 |
| SB39 | 10 | | 1 | 1 | 0.00 |
| SB39 | 20 | | 1 | 1 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| SB39 | 55 | | 1 | 1 | 0.00 |
| SB40 | 21 | | 1 | 1 | 0.00 |
| SB40 | 30 | | 1 | 1 | 0.00 |
| SB40 | 50 | * | 178 | 159 | 11.28 |
| SB40 | 65 | * | 130 | 128 | 1.55 |
| SB40 | 70 | | 1 | 1 | 0.00 |
| SB41 | 0 | * | 170 | 177 | 4.03 |
| SB41 | 5 | | 4 | 4.2 | 4.88 |
| SB41 | 55 | | 1 | 1 | 0.00 |
| SB42 | 5 | | 3.1 | 3.1 | 0.00 |
| SB42 | 35 | | 1 | 1 | 0.00 |
| SB42 | 55 | * | 157 | 210 | 28.88 |
| SB43 | 0 | * | 213 | 193 | 9.85 |
| SB43 | 5 | | 4 | 4 | 0.00 |
| SB43 | 55 | | 1 | 1 | 0.00 |
| SB44 | 35 | | 1 | 1 | 0.00 |
| SB44 | 45 | | 1 | 1 | 0.00 |
| SB45 | 5 | | 1 | 1 | 0.00 |
| SB45 | 10 | | 1 | 1 | 0.00 |
| SB45 | 35 | | 1 | 1 | 0.00 |
| SB45 | 55 | * | 62 | 64 | 3.17 |
| SB46 | 20 | | 1 | 1 | 0.00 |
| SB46 | 44 | | 1 | 1 | 0.00 |
| SB47 | 10 | * | 239 | 234 | 2.11 |
| SB47 | 45 | | 1 | 1 | 0.00 |
| SB48 | 0 | | 1 | 1 | 0.00 |
| SB48 | 10 | | 1 | 1 | 0.00 |
| SB48 | 52 | | 1 | 1 | 0.00 |
| SB48 | 53 | * | 91 | 80 | 12.87 |
| SB49 | 35 | | 1 | 1 | 0.00 |
| SB49 | 45 | | 1 | 1 | 0.00 |
| SB50 | 30 | * | 197 | 158 | 21.97 |
| SB50 | 55 | | 1 | 1 | 0.00 |
| SB51 | 35 | | 1 | 1 | 0.00 |
| SB51 | 65 | | 1 | 1 | 0.00 |
| SB52 | 35 | | 1 | 1 | 0.00 |
| SB52 | 50 | | 1 | 1 | 0.00 |
| SB53 | 30 | | 1 | 1 | 0.00 |
| SB53 | 50 | | 1 | 1 | 0.00 |
| SB53 | 80 | * | 116 | 108 | 7.14 |
| SB54 | 25 | | 1 | 1 | 0.00 |
| SB54 | 35 | | 1 | 1 | 0.00 |
| SB54 | 80 | * | 103 | 83 | 21.51 |
| SB54 | 85 | * | 70 | 101 | 36.26 |
| SB54 | 90 | | 1 | 1 | 0.00 |
| SB56 | 20 | | 1 | 1 | 0.00 |
| SB56 | 55 | | 1 | 1 | 0.00 |
| SB56 | 55 | * | 162 | 193 | 17.46 |
| SB56 | 85 | * | 152 | 140 | 8.22 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB57 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB57 | | 50 | | | | 1 | | 1 | | 0.00 |
| SB57 | | 50 | | * | | 182 | | 176 | | 3.35 |
| SB57 | | 65 | | | | 1 | | 1 | | 0.00 |
| SB58 | | 5 | | | | 5.9 | | 5.5 | | 7.02 |
| SB58 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB58 | | 65 | | | | 1 | | 1 | | 0.00 |
| SB58 | | 80 | | * | | 211 | | 226 | | 6.86 |
| SB59 | | 30 | | | | 1 | | 1 | | 0.00 |
| SB59 | | 55 | | | | 1 | | 1 | | 0.00 |
| SB59 | | 60 | | | | 1 | | 1 | | 0.00 |
| SB59 | | 95 | | * | | 269 | | 271 | | 0.74 |
| SB60 | | 20 | | | | 1 | | 1 | | 0.00 |
| SB60 | | 25 | | | | 1 | | 1 | | 0.00 |
| SB60 | | 30 | | | | 1 | | 1 | | 0.00 |
| SB60 | | 70 | | * | | 166 | | 180 | | 8.09 |
| SB61 | | 25 | | | | 1 | | 1 | | 0.00 |
| SB61 | | 50 | | | | 1 | | 1 | | 0.00 |
| SB61 | | 80 | | * | | 186 | | 205 | | 9.72 |
| SB62 | | 60 | | * | | 198 | | 218 | | 9.62 |
| SB62 | | 65 | | | | 1 | | 1 | | 0.00 |
| SB62 | | 90 | | | | 1 | | 1 | | 0.00 |
| SB63 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB63 | | 50 | | | | 1 | | 1 | | 0.00 |
| SB63 | | 70 | | | | 1 | | 1 | | 0.00 |
| SB63 | | 80 | | * | | 166 | | 156 | | 6.21 |
| SB63 | | 90 | | | | 1 | | 1 | | 0.00 |
| SB64 | | 5 | | | | 8.9 | | 9 | | 1.12 |
| SB64 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB65 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB65 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB65 | | 85 | | * | | 122 | | 179 | | 37.87 |
| SB66 | | 15 | | * | | 106 | | 124 | | 15.65 |
| SB66 | | 35 | | | | 1 | | 1 | | 0.00 |
| SB66 | | 40 | | | | 1 | | 1 | | 0.00 |
| SB67 | | 11 | | * | | 80 | | 96 | | 18.18 |
| SB67 | | 25 | | | | 1 | | 1 | | 0.00 |
| SB67 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB67 | | 65 | | | | 1 | | 1 | | 0.00 |
| SB68 | | 55 | | * | | 79 | | 72 | | 9.27 |
| SB69 | | 0 | | * | | 97.2 | | 75.9 | | 24.61 |
| SB69 | | 30 | | | | 1 | | 1 | | 0.00 |
| SB69 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB70 | | 40 | | * | | 85 | | 93 | | 8.99 |
| SB70 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB70 | | 65 | | | | 1 | | 1 | | 0.00 |
| SB71 | | 25 | | | | 14 | | 8.7 | | 46.70 |
| SB71 | | 45 | | | | 1 | | 1 | | 0.00 |
| SB71 | | 55 | | * | | 35 | | 52 | | 39.08 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 1 | | 1 | 0.00 |
| SB72 | | 45 | | * | | 82 | | 66 | 21.62 |
| SB72 | | 75 | | * | | 45.5 | | 58.2 | 24.49 |
| SB73 | | 15 | | | | 1 | | 1 | 0.00 |
| SB73 | | 35 | | | | 1 | | 1 | 0.00 |
| SB73 | | 40 | | | | 1 | | 1 | 0.00 |
| SB74 | | 15 | | | | 1 | | 1 | 0.00 |
| SB74 | | 35 | | | | 1 | | 1 | 0.00 |
| SB74 | | 40 | | | | 1 | | 1 | 0.00 |
| SB76 | | 10 | | | | 1 | | 1 | 0.00 |
| SB76 | | 15 | | | | 1 | | 1 | 0.00 |
| SB76 | | 60 | | | | 1 | | 1 | 0.00 |
| SB76 | | 65 | | | | 1 | | 1 | 0.00 |
| SB76 | | 80 | | | | 1 | | 1 | 0.00 |
| SB77 | | 25 | | | | 1 | | 4.1 | 121.57 |
| SB77 | | 40 | | | | 1 | | 1 | 0.00 |
| SB77 | | 50 | | | | 1 | | 1 | 0.00 |
| SB77 | | 55 | | | | 1 | | 1 | 0.00 |

| FEILD ANALYTICAL DUPLICATE RESULTS FOR CHLOROFORM IN SOILS | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per kilogram) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW04-1S | 15 | * | 0.79 | 0.78 | 1.27 |
| MW13-1I | 20 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 135 | * | 9.13 | 9.06 | 0.77 |
| MW13-2B | 175.5-178 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 201-201.5 | * | 9.43 | 8.66 | 8.51 |
| MW16-1D | 5 | * | 10.2 | 9.6 | 6.06 |
| MW17-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 9-10 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 30 | * | 49 | 51 | 4.00 |
| MW17-2D | 97-98 | * | 38 | 34 | 11.11 |
| MW19-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 20 | * | 33.9 | 29.2 | 14.90 |
| MW19-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 5 | * | 21 | 23 | 9.09 |
| MW22-1D | 15 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 25 | * | 39 | 33 | 16.67 |
| MW25-2I | 35-37 | * | 34 | 38 | 11.11 |
| MW26-2I | 39 | | 0.5 | 0.5 | 0.00 |
| MW26-2I | 39 | * | 6.8 | 7.4 | 8.45 |
| MW27-1B | 129-130 | * | 30 | 32 | 6.45 |
| MW27-1B | 206-207 | | 0.5 | 0.5 | 0.00 |
| MW27-1B | 42-43 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 15 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 48 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 62-63 | | 0.5 | 0.5 | 0.00 |
| MW27-3I | 46 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 160-160.5 | * | 10.9 | 9.4 | 14.78 |
| MW28-1B | 160-160.5 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 19.5-20 | | 0.56 | 0.5 | 11.32 |
| MW28-1B | 247.5-248 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 81-81.5 | * | 7.7 | 7.7 | 0.00 |
| MW28-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW29-1D | 32-33 | | 13 | 13 | 0.00 |
| MW33-1D | 0 | * | 29.4 | 29.8 | 1.35 |
| MW33-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 5 | * | 32.9 | 39.2 | 17.48 |
| MW35-1D | 5 | * | 48 | 50 | 4.08 |
| MW35-1D | 20 | | 0.5 | 0.5 | 0.00 |
| MW35-1D | 41-42 | | 0.5 | 0.5 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| MW36-1D | | 5 | * | 42.6 | 41.9 | 1.66 |
| MW36-1D | | 25 | | 0.5 | 0.5 | 0.00 |
| MW36-2I | | 53 | * | 36.1 | 36.1 | 0.00 |
| MW37-1D | | 35 | | 0.5 | 0.5 | 0.00 |
| MW38-1I | | 20 | | 0.5 | 0.5 | 0.00 |
| MW38-1I | | 43 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | | 10 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | | 125 | * | 20.2 | 20.6 | 1.96 |
| PZ14 | | 10 | | 0.5 | 0.5 | 0.00 |
| PZ15 | | 10 | | 0.5 | 0.5 | 0.00 |
| PZ32 | | 0 | * | 1.1 | 1.1 | 0.00 |
| SB03 | | 0 | | 0.5 | 0.5 | 0.00 |
| SB03 | | 15 | * | 0.5 | 0.5 | 0.00 |
| SB05 | | 5 | | 0.5 | 0.5 | 0.00 |
| SB06 | | 10 | | 0.5 | 0.5 | 0.00 |
| SB09 | | 10 | | 0.5 | 0.5 | 0.00 |
| SB10 | | 5 | | 0.5 | 0.5 | 0.00 |
| SB11 | | 5 | | 0.5 | 0.5 | 0.00 |
| SB12 | | 15 | * | 0.66 | 0.41 | 46.73 |
| SB14 | | 5 | | 0.5 | 0.5 | 0.00 |
| SB16 | | 10 | | 0.5 | 0.5 | 0.00 |
| SB19 | | 10 | | 0.5 | 0.5 | 0.00 |
| SB21 | | 10 | | 0.5 | 0.5 | 0.00 |
| SB23 | | 20 | | 0.5 | 0.5 | 0.00 |
| SB24 | | 15 | | 0.5 | 0.5 | 0.00 |
| SB26 | | 13 | | 0.5 | 0.5 | 0.00 |
| SB28 | | 0.5 | | 0.5 | 0.5 | 0.00 |
| SB28 | | 51 | * | 29.5 | 29.9 | 1.35 |
| SB32 | | 5 | | 0.5 | 0.5 | 0.00 |
| SB32 | | 46 | * | 0.5 | 26 | 192.45 |
| SB33 | | 15 | * | 29.7 | 30.8 | 3.64 |
| SB33 | | 35 | | 0.5 | 0.5 | 0.00 |
| SB33 | | 48 | * | 38.2 | 35.1 | 8.46 |
| SB34 | | 25 | | 0.5 | 0.5 | 0.00 |
| SB34 | | 43 | | 0.5 | 0.5 | 0.00 |
| SB34 | | 45 | * | 45 | 42 | 6.90 |
| SB35 | | 35 | | 0.5 | 0.5 | 0.00 |
| SB35 | | 40 | | 0.5 | 0.5 | 0.00 |
| SB36 | | 5 | * | 33 | 30.1 | 9.19 |
| SB36 | | 10 | | 0.5 | 0.5 | 0.00 |
| SB37 | | 5 | * | 38.7 | 31 | 22.09 |
| SB37 | | 10 | | 0.5 | 0.5 | 0.00 |
| SB38 | | 5 | * | 39.1 | 38.3 | 2.07 |
| SB38 | | 25 | | 0.5 | 0.5 | 0.00 |
| SB38 | | 34 | | 0.5 | 0.5 | 0.00 |
| SB38 | | 55 | * | 31.8 | 31.4 | 1.27 |
| SB39 | | 0 | * | 38.8 | 33.7 | 14.07 |
| SB39 | | 10 | | 0.5 | 0.5 | 0.00 |
| SB39 | | 20 | | 0.5 | 0.5 | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB39 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 21 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 50 | | * | | 37.4 | | 32.5 | | 14.02 |
| SB40 | | 65 | | * | | 35 | | 30.2 | | 14.72 |
| SB40 | | 70 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 0 | | * | | 44.3 | | 42.8 | | 3.44 |
| SB41 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 55 | | * | | 28.9 | | 34.1 | | 16.51 |
| SB43 | | 0 | | * | | 49 | | 45.6 | | 7.19 |
| SB43 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB43 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB44 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB44 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 55 | | * | | 35.1 | | 27.8 | | 23.21 |
| SB46 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB46 | | 44 | | | | 0.5 | | 0.5 | | 0.00 |
| SB47 | | 10 | | * | | 48 | | 48 | | 0.00 |
| SB47 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 0 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 52 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 53 | | * | | 35 | | 41 | | 15.79 |
| SB49 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB49 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB50 | | 30 | | * | | 40.2 | | 41.9 | | 4.14 |
| SB50 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB51 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB51 | | 65 | | | | 0.28 | | 0.32 | | 13.33 |
| SB52 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB52 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 80 | | * | | 38.1 | | 34.4 | | 10.21 |
| SB54 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB54 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB54 | | 80 | | * | | 34.1 | | 33.6 | | 1.48 |
| SB54 | | 85 | | * | | 28.6 | | 30.6 | | 6.76 |
| SB54 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | * | | 27.9 | | 31.1 | | 10.85 |
| SB56 | | 85 | | * | | 26.4 | | 25.1 | | 5.05 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB57 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB57 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB57 | | 50 | | * | | 32.1 | | 30.4 | | 5.44 |
| SB57 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 80 | | * | | 38.6 | | 37.6 | | 2.62 |
| SB59 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 60 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 95 | | * | | 52.1 | | 51.5 | | 1.16 |
| SB60 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 70 | | * | | 37.1 | | 37.8 | | 1.87 |
| SB61 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB61 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB61 | | 80 | | * | | 36.4 | | 33.6 | | 8.00 |
| SB62 | | 60 | | * | | 32.7 | | 33.4 | | 2.12 |
| SB62 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB62 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 70 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 80 | | * | | 35 | | 29.9 | | 15.72 |
| SB63 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 85 | | * | | 36.9 | | 37.7 | | 2.14 |
| SB66 | | 15 | | * | | 25.3 | | 24.9 | | 1.59 |
| SB66 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB66 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 11 | | * | | 20 | | 21 | | 4.88 |
| SB67 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB68 | | 55 | | * | | 19 | | 18 | | 5.41 |
| SB69 | | 0 | | * | | 21.8 | | 19.6 | | 10.63 |
| SB69 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB69 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB70 | | 40 | | * | | 16.1 | | 16.9 | | 4.85 |
| SB70 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB70 | | 65 | | | | 0.55 | | 0.49 | | 11.54 |
| SB71 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 55 | | * | | 11.6 | | 13.6 | | 15.87 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB72 | | 45 | | * | | 14.7 | | 12.4 | | 16.97 |
| SB72 | | 75 | | * | | 13.3 | | 14.5 | | 8.63 |
| SB73 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB73 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB73 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 60 | | | | 0.49 | | 0.52 | | 5.94 |
| SB76 | | 65 | | | | 0.75 | | 0.81 | | 7.69 |
| SB76 | | 80 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 50 | | | | 0.77 | | 0.58 | | 28.15 |
| SB77 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |

| FEILD ANALYTICAL DUPLICATE RESULTS FOR 1,1,1-TCA IN SOILS | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per kilogram) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW04-1S | 15 | * | 0.83 | 0.68 | 19.87 |
| MW13-1I | 20 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 135 | * | 7.32 | 7.33 | 0.14 |
| MW13-2B | 175.5-178 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 201-201.5 | * | 7.29 | 6.71 | 8.29 |
| MW16-1D | 5 | * | 8.1 | 7.9 | 2.50 |
| MW17-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 9-10 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 30 | * | 38 | 41 | 7.59 |
| MW17-2D | 97-98 | * | 34 | 32 | 6.06 |
| MW19-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 20 | * | 29.7 | 25.2 | 16.39 |
| MW19-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 5 | * | 20 | 22 | 9.52 |
| MW22-1D | 15 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 25 | * | 32 | 28 | 13.33 |
| MW25-2I | 35-37 | * | 31 | 36 | 14.93 |
| MW26-2I | 39 | | 0.5 | 0.5 | 0.00 |
| MW26-2I | 39 | * | 6 | 6.5 | 8.00 |
| MW27-1B | 129-130 | * | 25 | 27 | 7.69 |
| MW27-1B | 206-207 | | 0.5 | 0.5 | 0.00 |
| MW27-1B | 42-43 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 15 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 48 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 62-63 | | 0.5 | 0.5 | 0.00 |
| MW27-3I | 46 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 160-160.5 | * | 8 | 6.9 | 14.77 |
| MW28-1B | 160-160.5 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 19.5-20 | | 0.17 | 0.5 | 98.51 |
| MW28-1B | 247.5-248 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 81-81.5 | * | 5.9 | 6 | 1.68 |
| MW28-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW29-1D | 32-33 | | 3.9 | 3.8 | 2.60 |
| MW33-1D | 0 | * | 26.5 | 27 | 1.87 |
| MW33-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 5 | * | 29.3 | 35 | 17.73 |
| MW35-1D | 5 | * | 40 | 42 | 4.88 |
| MW35-1D | 20 | | 0.5 | 0.5 | 0.00 |
| MW35-1D | 41-42 | | 0.5 | 0.5 | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| MW36-1D | | 5 | | * | | 39.4 | | 39.2 | | 0.51 |
| MW36-1D | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| MW36-2I | | 53 | | * | | 34.9 | | 33.9 | | 2.91 |
| MW37-1D | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| MW38-1I | | 20 | | | | 1 | | 0.85 | | 16.22 |
| MW38-1I | | 43 | | | | 0.7 | | 0.64 | | 8.96 |
| MW39-1D | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| MW39-1D | | 125 | | * | | 20 | | 20.6 | | 2.96 |
| PZ14 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| PZ15 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| PZ32 | | 0 | | * | | 0.69 | | 0.66 | | 4.44 |
| SB03 | | 0 | | | | 0.5 | | 0.5 | | 0.00 |
| SB03 | | 15 | | * | | 0.5 | | 0.5 | | 0.00 |
| SB05 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB06 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB09 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB10 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB11 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB12 | | 15 | | * | | 0.3 | | 0.21 | | 35.29 |
| SB14 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB16 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB19 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB21 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB23 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB24 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB26 | | 13 | | | | 0.5 | | 0.5 | | 0.00 |
| SB28 | | 0.5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB28 | | 51 | | * | | 30.3 | | 30.2 | | 0.33 |
| SB32 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB32 | | 46 | | * | | 0.5 | | 24.5 | | 192.00 |
| SB33 | | 15 | | * | | 25.7 | | 27.6 | | 7.13 |
| SB33 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB33 | | 48 | | * | | 33.4 | | 30.6 | | 8.75 |
| SB34 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB34 | | 43 | | | | 0.5 | | 0.5 | | 0.00 |
| SB34 | | 45 | | * | | 42.3 | | 41.1 | | 2.88 |
| SB35 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB35 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB36 | | 5 | | * | | 30.1 | | 27.6 | | 8.67 |
| SB36 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB37 | | 5 | | * | | 34.5 | | 28 | | 20.80 |
| SB37 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB38 | | 5 | | * | | 33.6 | | 32.5 | | 3.33 |
| SB38 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB38 | | 34 | | | | 0.5 | | 0.5 | | 0.00 |
| SB38 | | 55 | | * | | 30.9 | | 30.7 | | 0.65 |
| SB39 | | 0 | | * | | 35 | | 30.4 | | 14.07 |
| SB39 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB39 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB39 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 21 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 50 | | * | | 35.2 | | 29.6 | | 17.28 |
| SB40 | | 65 | | * | | 33.1 | | 29.2 | | 12.52 |
| SB40 | | 70 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 0 | | * | | 41 | | 39.8 | | 2.97 |
| SB41 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 55 | | * | | 25.1 | | 29.7 | | 16.79 |
| SB43 | | 0 | | * | | 45.2 | | 42.3 | | 6.63 |
| SB43 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB43 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB44 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB44 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 55 | | * | | 34.9 | | 28.5 | | 20.19 |
| SB46 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB46 | | 44 | | | | 0.5 | | 0.5 | | 0.00 |
| SB47 | | 10 | | * | | 42 | | 43 | | 2.35 |
| SB47 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 0 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 52 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 53 | | * | | 33 | | 40 | | 19.18 |
| SB49 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB49 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB50 | | 30 | | * | | 34 | | 39.4 | | 14.71 |
| SB50 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB51 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB51 | | 65 | | | | ND | | ND | | #VALUE! |
| SB52 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB52 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 80 | | * | | 34.5 | | 31.3 | | 9.73 |
| SB54 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB54 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB54 | | 80 | | * | | 30.9 | | 32.6 | | 5.35 |
| SB54 | | 85 | | * | | 27.5 | | 29.7 | | 7.69 |
| SB54 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | * | | 27.7 | | 31.3 | | 12.20 |
| SB56 | | 85 | | * | | 26.5 | | 25.4 | | 4.24 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB57 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB57 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB57 | | 50 | | * | | 30.9 | | 30.3 | | 1.96 |
| SB57 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 80 | | * | | 34.5 | | 32.5 | | 5.97 |
| SB59 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 60 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 95 | | * | | 48 | | 46.3 | | 3.61 |
| SB60 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 70 | | * | | 35 | | 36.1 | | 3.09 |
| SB61 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB61 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB61 | | 80 | | * | | 34.5 | | 31.7 | | 8.46 |
| SB62 | | 60 | | * | | 32 | | 32.7 | | 2.16 |
| SB62 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB62 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 35 | | | | 0.83 | | 1.1 | | 27.98 |
| SB63 | | 50 | | | | 0.17 | | 0.29 | | 52.17 |
| SB63 | | 70 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 80 | | * | | 33.3 | | 28.7 | | 14.84 |
| SB63 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 85 | | * | | 35.2 | | 36.2 | | 2.80 |
| SB66 | | 15 | | * | | 21.4 | | 20.4 | | 4.78 |
| SB66 | | 35 | | | | 0.7 | | 0.67 | | 4.38 |
| SB66 | | 40 | | | | 1.2 | | 1.2 | | 0.00 |
| SB67 | | 11 | | * | | 19 | | 19 | | 0.00 |
| SB67 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 65 | | | | 0.56 | | 0.64 | | 13.33 |
| SB68 | | 55 | | * | | 17 | | 17 | | 0.00 |
| SB69 | | 0 | | * | | 18.9 | | 17.1 | | 10.00 |
| SB69 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB69 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB70 | | 40 | | * | | 14.6 | | 15.2 | | 4.03 |
| SB70 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB70 | | 65 | | | | 1.6 | | 1.6 | | 0.00 |
| SB71 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 55 | | * | | 10.5 | | 12.4 | | 16.59 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB72 | | 45 | | * | | 14.3 | | 12.2 | | 15.85 |
| SB72 | | 75 | | * | | 12.6 | | 13.5 | | 6.90 |
| SB73 | | 15 | | | | 0.5 | | 0.39 | | 24.72 |
| SB73 | | 35 | | | | 0.5 | | 0.42 | | 17.39 |
| SB73 | | 40 | | | | 0.71 | | 0.78 | | 9.40 |
| SB74 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 60 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 80 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |

| FEILD ANALYTICAL DUPLICATE RESULTS FOR CARBON TETRACHLORIDE IN SOILS | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per kilogram) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW04-1S | 15 | * | 0.38 | 0.36 | 5.41 |
| MW13-1I | 20 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 135 | * | 4.21 | 4.15 | 1.44 |
| MW13-2B | 175.5-178 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 201-201.5 | * | 4.16 | 3.86 | 7.48 |
| MW16-1D | 5 | * | 4.8 | 4.6 | 4.26 |
| MW17-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 9-10 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 30 | * | 23 | 24 | 4.26 |
| MW17-2D | 97-98 | * | 19 | 18 | 5.41 |
| MW19-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 20 | * | 16.8 | 14.5 | 14.70 |
| MW19-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 5 | * | 12.4 | 14 | 12.12 |
| MW22-1D | 15 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 25 | * | 18 | 16 | 11.76 |
| MW25-2I | 35-37 | * | 19 | 22 | 14.63 |
| MW26-2I | 39 | | 0.5 | 0.5 | 0.00 |
| MW26-2I | 39 | * | 3.6 | 3.8 | 5.41 |
| MW27-1B | 129-130 | * | 14 | 16 | 13.33 |
| MW27-1B | 206-207 | | 0.5 | 0.5 | 0.00 |
| MW27-1B | 42-43 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 15 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 48 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 62-63 | | 0.5 | 0.5 | 0.00 |
| MW27-3I | 46 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 160-160.5 | * | 4.7 | 4 | 16.09 |
| MW28-1B | 160-160.5 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 19.5-20 | | 0.13 | 0.5 | 117.46 |
| MW28-1B | 247.5-248 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 81-81.5 | * | 3.3 | 3.4 | 2.99 |
| MW28-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW29-1D | 32-33 | | 12.3 | 12.9 | 4.76 |
| MW33-1D | 0 | * | 15.7 | 16.1 | 2.52 |
| MW33-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 5 | * | 17.4 | 20.4 | 15.87 |
| MW35-1D | 5 | * | 23 | 24 | 4.26 |
| MW35-1D | 20 | | 0.5 | 0.5 | 0.00 |
| MW35-1D | 41-42 | | 0.5 | 0.5 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| MW36-1D | 5 | * | 23.8 | 23.3 | 2.12 |
| MW36-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW36-2I | 53 | * | 21.8 | 21.4 | 1.85 |
| MW37-1D | 35 | | 0.5 | 0.5 | 0.00 |
| MW38-1I | 20 | | 0.5 | 0.5 | 0.00 |
| MW38-1I | 43 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 125 | * | 12.4 | 13.1 | 5.49 |
| PZ14 | 10 | | 0.5 | 0.5 | 0.00 |
| PZ15 | 10 | | 0.5 | 0.5 | 0.00 |
| PZ32 | 0 | * | 0.69 | 0.65 | 5.97 |
| SB03 | 0 | | 0.5 | 0.5 | 0.00 |
| SB03 | 15 | * | 0.5 | 0.5 | 0.00 |
| SB05 | 5 | | 0.5 | 0.5 | 0.00 |
| SB06 | 10 | | 0.5 | 0.5 | 0.00 |
| SB09 | 10 | | 0.5 | 0.5 | 0.00 |
| SB10 | 5 | | 0.5 | 0.5 | 0.00 |
| SB11 | 5 | | 0.5 | 0.5 | 0.00 |
| SB12 | 15 | * | 0.3 | 0.21 | 35.29 |
| SB14 | 5 | | 0.5 | 0.5 | 0.00 |
| SB16 | 10 | | 0.5 | 0.5 | 0.00 |
| SB19 | 10 | | 0.5 | 0.5 | 0.00 |
| SB21 | 10 | | 0.5 | 0.5 | 0.00 |
| SB23 | 20 | | 0.5 | 0.5 | 0.00 |
| SB24 | 15 | | 0.5 | 0.5 | 0.00 |
| SB26 | 13 | | 0.5 | 0.5 | 0.00 |
| SB28 | 0.5 | | 0.5 | 0.5 | 0.00 |
| SB28 | 51 | * | 18.1 | 18.6 | 2.72 |
| SB32 | 5 | | 0.5 | 0.5 | 0.00 |
| SB32 | 46 | * | 0.5 | 14.5 | 186.67 |
| SB33 | 15 | * | 15 | 16 | 6.45 |
| SB33 | 35 | | 0.5 | 0.5 | 0.00 |
| SB33 | 48 | * | 19.9 | 18.3 | 8.38 |
| SB34 | 25 | | 0.5 | 0.5 | 0.00 |
| SB34 | 43 | | 0.5 | 0.5 | 0.00 |
| SB34 | 45 | * | 24 | 23.7 | 1.26 |
| SB35 | 35 | | 0.5 | 0.5 | 0.00 |
| SB35 | 40 | | 0.5 | 0.5 | 0.00 |
| SB36 | 5 | * | 17.4 | 15.9 | 9.01 |
| SB36 | 10 | | 0.5 | 0.5 | 0.00 |
| SB37 | 5 | * | 19.8 | 15.9 | 21.85 |
| SB37 | 10 | | 0.5 | 0.5 | 0.00 |
| SB38 | 5 | * | 19.7 | 19.4 | 1.53 |
| SB38 | 25 | | 0.5 | 0.5 | 0.00 |
| SB38 | 34 | | 0.5 | 0.5 | 0.00 |
| SB38 | 55 | * | 17.8 | 17.5 | 1.70 |
| SB39 | 0 | * | 20.5 | 17.9 | 13.54 |
| SB39 | 10 | | 0.5 | 0.5 | 0.00 |
| SB39 | 20 | | 0.5 | 0.5 | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB39 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 21 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 50 | | * | | 20.8 | | 17.7 | | 16.10 |
| SB40 | | 65 | | * | | 19.4 | | 16.9 | | 13.77 |
| SB40 | | 70 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 0 | | * | | 24.2 | | 23.3 | | 3.79 |
| SB41 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 55 | | * | | 14.8 | | 17.6 | | 17.28 |
| SB43 | | 0 | | * | | 26.6 | | 25.2 | | 5.41 |
| SB43 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB43 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB44 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB44 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 55 | | * | | 19.1 | | 15.4 | | 21.45 |
| SB46 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB46 | | 44 | | | | 0.5 | | 0.5 | | 0.00 |
| SB47 | | 10 | | * | | 24 | | 24 | | 0.00 |
| SB47 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 0 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 52 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 53 | | * | | 19 | | 22 | | 14.63 |
| SB49 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB49 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB50 | | 30 | | * | | 19.9 | | 23 | | 14.45 |
| SB50 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB51 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB51 | | 65 | | | | 3.4 | | 3.3 | | 2.99 |
| SB52 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB52 | | 50 | | | | 1.9 | | 1.9 | | 0.00 |
| SB53 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 80 | | * | | 20.7 | | 18.9 | | 9.09 |
| SB54 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB54 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB54 | | 80 | | * | | 17.7 | | 19 | | 7.08 |
| SB54 | | 85 | | * | | 15.8 | | 17.6 | | 10.78 |
| SB54 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | * | | 16.9 | | 19.3 | | 13.26 |
| SB56 | | 85 | | * | | 16.2 | | 15.7 | | 3.13 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB57 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB57 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB57 | | 50 | | * | | 18.8 | | 18.3 | | 2.70 |
| SB57 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 80 | | * | | 21.3 | | 20.1 | | 5.80 |
| SB59 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 60 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 95 | | * | | 28.3 | | 28.2 | | 0.35 |
| SB60 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB60 | | 70 | | * | | 21.4 | | 21.9 | | 2.31 |
| SB61 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB61 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB61 | | 80 | | * | | 21.3 | | 19.2 | | 10.37 |
| SB62 | | 60 | | * | | 20 | | 20.2 | | 1.00 |
| SB62 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB62 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 70 | | | | 0.4 | | 0.44 | | 9.52 |
| SB63 | | 80 | | * | | 20.3 | | 17.4 | | 15.38 |
| SB63 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 85 | | * | | 20.6 | | 21.1 | | 2.40 |
| SB66 | | 15 | | * | | 12.4 | | 12 | | 3.28 |
| SB66 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB66 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 11 | | * | | 11 | | 11 | | 0.00 |
| SB67 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB68 | | 55 | | * | | 10 | | 10 | | 0.00 |
| SB69 | | 0 | | * | | 11.4 | | 10.3 | | 10.14 |
| SB69 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB69 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB70 | | 40 | | * | | 8.6 | | 9.1 | | 5.65 |
| SB70 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB70 | | 65 | | | | 2.7 | | 2.5 | | 7.69 |
| SB71 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 55 | | * | | 6 | | 7.3 | | 19.55 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB72 | | 45 | | * | | 8.4 | | 7.3 | | 14.01 |
| SB72 | | 75 | | * | | 7.2 | | 7.8 | | 8.00 |
| SB73 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB73 | | 35 | | | | 0.69 | | 0.65 | | 5.97 |
| SB73 | | 40 | | | | 0.99 | | 1.1 | | 10.53 |
| SB74 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 10 | | | | 0.9 | | 0.83 | | 8.09 |
| SB76 | | 15 | | | | 0.92 | | 1.5 | | 47.93 |
| SB76 | | 60 | | | | 3 | | 2.8 | | 6.90 |
| SB76 | | 65 | | | | 3.9 | | 4.5 | | 14.29 |
| SB76 | | 80 | | | | 1.6 | | 1.4 | | 13.33 |
| SB77 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |

| FEILD ANALYTICAL DUPLICATE RESULTS FOR TCE IN SOILS | | | | | |
|---|---|---|---|---|---|
| (Results in micrograms per kilogram) | | | | | |
| RPD = Relative Percent Difference | | | | | |
| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
| MW04-1S | 15 | * | 0.79 | 0.73 | 7.89 |
| MW13-1I | 20 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 135 | * | 9.2 | 8.95 | 2.75 |
| MW13-2B | 175.5-178 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 201-201.5 | * | 9.91 | 9.31 | 6.24 |
| MW16-1D | 5 | * | 11 | 10.5 | 4.65 |
| MW17-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 9-10 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 30 | * | 51 | 54 | 5.71 |
| MW17-2D | 97-98 | * | 37 | 36 | 2.74 |
| MW19-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 20 | * | 33.2 | 28.9 | 13.85 |
| MW19-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 5 | * | 24 | 26 | 8.00 |
| MW22-1D | 15 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 25 | * | 41 | 38 | 7.59 |
| MW25-2I | 35-37 | * | 39 | 44 | 12.05 |
| MW26-2I | 39 | | 0.5 | 0.5 | 0.00 |
| MW26-2I | 39 | * | 7.8 | 8.2 | 5.00 |
| MW27-1B | 129-130 | * | 28 | 32 | 13.33 |
| MW27-1B | 206-207 | | 0.5 | 0.5 | 0.00 |
| MW27-1B | 42-43 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 15 | | 0.5 | 0.5 | 0.00 |
| MW27-2D | 48 | | 0.21 | 0.11 | 62.50 |
| MW27-2D | 62-63 | | 0.5 | 0.5 | 0.00 |
| MW27-3I | 46 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 160-160.5 | * | 10.1 | 9.1 | 10.42 |
| MW28-1B | 160-160.5 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 19.5-20 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 247.5-248 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 81-81.5 | * | 6.8 | 7.1 | 4.32 |
| MW28-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW29-1D | 32-33 | | 3.7 | 4.5 | 19.51 |
| MW33-1D | 0 | * | 33.1 | 34.3 | 3.56 |
| MW33-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 5 | * | 35.7 | 41.9 | 15.98 |
| MW35-1D | 5 | * | 44 | 47 | 6.59 |
| MW35-1D | 20 | | 0.5 | 0.5 | 0.00 |
| MW35-1D | 41-42 | | 0.5 | 0.5 | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| MW36-1D | | 5 | | * | | 45.8 | | 43.3 | | 5.61 |
| MW36-1D | | 25 | | | | 1.2 | | 1.4 | | 15.38 |
| MW36-2I | | 53 | | * | | 40.8 | | 39.7 | | 2.73 |
| MW37-1D | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| MW38-1I | | 20 | | | | 6.8 | | 8.3 | | 19.87 |
| MW38-1I | | 43 | | | | 1.8 | | 1.7 | | 5.71 |
| MW39-1D | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| MW39-1D | | 125 | | * | | 21.1 | | 22.5 | | 6.42 |
| PZ14 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| PZ15 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| PZ32 | | 0 | | * | | 1.5 | | 1.5 | | 0.00 |
| SB03 | | 0 | | | | 0.5 | | 0.5 | | 0.00 |
| SB03 | | 15 | | * | | 0.5 | | 0.5 | | 0.00 |
| SB05 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB06 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB09 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB10 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB11 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB12 | | 15 | | * | | 0.6 | | 0.37 | | 47.42 |
| SB14 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB16 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB19 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB21 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB23 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB24 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB26 | | 13 | | | | 0.5 | | 0.5 | | 0.00 |
| SB28 | | 0.5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB28 | | 51 | | * | | 36.9 | | 35.8 | | 3.03 |
| SB32 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB32 | | 46 | | * | | 0.5 | | 30.3 | | 193.51 |
| SB33 | | 15 | | * | | 33.1 | | 35.2 | | 6.15 |
| SB33 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB33 | | 48 | | * | | 39.4 | | 36.5 | | 7.64 |
| SB34 | | 25 | | | | 0.51 | | 0.63 | | 21.05 |
| SB34 | | 43 | | | | 0.5 | | 0.5 | | 0.00 |
| SB34 | | 45 | | * | | 49.4 | | 44.5 | | 10.44 |
| SB35 | | 35 | | | | 1.4 | | 1.6 | | 13.33 |
| SB35 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB36 | | 5 | | * | | 31.8 | | 29.1 | | 8.87 |
| SB36 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB37 | | 5 | | * | | 36 | | 28.3 | | 23.95 |
| SB37 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB38 | | 5 | | * | | 37.4 | | 36.5 | | 2.44 |
| SB38 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB38 | | 34 | | | | 0.5 | | 0.5 | | 0.00 |
| SB38 | | 55 | | * | | 30 | | 30.5 | | 1.65 |
| SB39 | | 0 | | * | | 40.5 | | 34.7 | | 15.43 |
| SB39 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB39 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB39 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 21 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 50 | | * | | 37 | | 32.9 | | 11.73 |
| SB40 | | 65 | | * | | 34.9 | | 30 | | 15.10 |
| SB40 | | 70 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 0 | | * | | 42.7 | | 41.7 | | 2.37 |
| SB41 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 55 | | * | | 28.8 | | 34.6 | | 18.30 |
| SB43 | | 0 | | * | | 49.2 | | 45.1 | | 8.70 |
| SB43 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB43 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB44 | | 35 | | | | 0.62 | | 0.49 | | 23.42 |
| SB44 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB45 | | 55 | | * | | 35.2 | | 29.7 | | 16.95 |
| SB46 | | 20 | | | | 0.96 | | 0.96 | | 0.00 |
| SB46 | | 44 | | | | 0.3 | | 0.34 | | 12.50 |
| SB47 | | 10 | | * | | 53 | | 49 | | 7.84 |
| SB47 | | 45 | | | | 0.31 | | 0.3 | | 3.28 |
| SB48 | | 0 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 52 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 53 | | * | | 40 | | 41 | | 2.47 |
| SB49 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB49 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB50 | | 30 | | * | | 42.45 | | 46.6 | | 9.32 |
| SB50 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB51 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB51 | | 65 | | | | 11 | | 10 | | 9.52 |
| SB52 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB52 | | 50 | | | | 2.1 | | 2.1 | | 0.00 |
| SB53 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 80 | | * | | 35 | | 35.1 | | 0.29 |
| SB54 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB54 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB54 | | 80 | | * | | 38.8 | | 43.6 | | 11.65 |
| SB54 | | 85 | | * | | 26.8 | | 30.2 | | 11.93 |
| SB54 | | 90 | | | | 0.95 | | 1.2 | | 23.26 |
| SB56 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | * | | 30 | | 24.6 | | 19.78 |
| SB56 | | 85 | | * | | 29.4 | | 27.9 | | 5.24 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB57 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB57 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB57 | | 50 | | * | | 34.2 | | 32.4 | | 5.41 |
| SB57 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB58 | | 80 | | * | | 41.5 | | 40 | | 3.68 |
| SB59 | | 30 | | | | 1.3 | | 1.8 | | 32.26 |
| SB59 | | 55 | | | | 2.8 | | 3.2 | | 13.33 |
| SB59 | | 60 | | | | 3.4 | | 3.1 | | 9.23 |
| SB59 | | 95 | | * | | 55.1 | | 54.3 | | 1.46 |
| SB60 | | 20 | | | | 0.44 | | 0.51 | | 14.74 |
| SB60 | | 25 | | | | 0.53 | | 0.55 | | 3.70 |
| SB60 | | 30 | | | | 0.26 | | 0.23 | | 12.24 |
| SB60 | | 70 | | * | | 39.5 | | 40 | | 1.26 |
| SB61 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB61 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB61 | | 80 | | * | | 39.6 | | 35.4 | | 11.20 |
| SB62 | | 60 | | * | | 36.7 | | 37.8 | | 2.95 |
| SB62 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB62 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 35 | | | | 0.97 | | 0.98 | | 1.03 |
| SB63 | | 50 | | | | 0.2 | | 0.26 | | 26.09 |
| SB63 | | 70 | | | | 6.4 | | 7.1 | | 10.37 |
| SB63 | | 80 | | * | | 36.7 | | 32.4 | | 12.45 |
| SB63 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 45 | | | | 6.1 | | 7.7 | | 23.19 |
| SB65 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 85 | | * | | 37.7 | | 38.4 | | 1.84 |
| SB66 | | 15 | | * | | 28.9 | | 29.4 | | 1.72 |
| SB66 | | 35 | | | | 3.3 | | 3 | | 9.52 |
| SB66 | | 40 | | | | 2.8 | | 4.1 | | 37.68 |
| SB67 | | 11 | | * | | 21 | | 22 | | 4.65 |
| SB67 | | 25 | | | | 1.8 | | 1.6 | | 11.76 |
| SB67 | | 45 | | | | 3 | | 3.4 | | 12.50 |
| SB67 | | 65 | | | | 2.8 | | 2.9 | | 3.51 |
| SB68 | | 55 | | * | | 20 | | 20 | | 0.00 |
| SB69 | | 0 | | * | | 21.7 | | 19.4 | | 11.19 |
| SB69 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB69 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB70 | | 40 | | * | | 18.2 | | 18.8 | | 3.24 |
| SB70 | | 45 | | | | 2.3 | | 2 | | 13.95 |
| SB70 | | 65 | | | | 13 | | 12 | | 8.00 |
| SB71 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 55 | | * | | 11.6 | | 13.8 | | 17.32 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 0.71 | | 0.82 | | 14.38 |
| SB72 | | 45 | | * | | 18.6 | | 15.2 | | 20.12 |
| SB72 | | 75 | | * | | 13.6 | | 15.5 | | 13.06 |
| SB73 | | 15 | | | | 3.2 | | 2.6 | | 20.69 |
| SB73 | | 35 | | | | 4.9 | | 4.7 | | 4.17 |
| SB73 | | 40 | | | | 6.7 | | 7.1 | | 5.80 |
| SB74 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 10 | | | | 4.2 | | 4.4 | | 4.65 |
| SB76 | | 15 | | | | 6.1 | | 7.6 | | 21.90 |
| SB76 | | 60 | | | | 28 | | 27 | | 3.64 |
| SB76 | | 65 | | | | 27 | | 30 | | 10.53 |
| SB76 | | 80 | | | | 9.6 | | 8.3 | | 14.53 |
| SB77 | | 25 | | | | 1.5 | | 1.7 | | 12.50 |
| SB77 | | 40 | | | | 2.9 | | 2.6 | | 10.91 |
| SB77 | | 50 | | | | 3.6 | | 2.5 | | 36.07 |
| SB77 | | 55 | | | | 1.6 | | 2 | | 22.22 |

## FEILD ANALYTICAL DUPLICATE RESULTS FOR PCE IN SOILS

(Results in micrograms per kilogram)

RPD = Relative Percent Difference

| Sample # | Depth | Matrix Spike | Conc. | Duplicate Conc. | RPD |
|---|---|---|---|---|---|
| MW04-1S | 15 | * | 0.34 | 0.34 | 0.00 |
| MW13-1I | 20 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 135 | * | 4.22 | 4.26 | 0.94 |
| MW13-2B | 175.5-178 | | 0.5 | 0.5 | 0.00 |
| MW13-2B | 201-201.5 | * | 4.76 | 4.71 | 1.06 |
| MW16-1D | 5 | * | 5 | 4.9 | 2.02 |
| MW17-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 9-10 | | 0.5 | 0.5 | 0.00 |
| MW17-2D | 30 | * | 28 | 31 | 10.17 |
| MW17-2D | 97-98 | * | 17 | 17 | 0.00 |
| MW19-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW19-1D | 20 | * | 19.2 | 16.1 | 17.56 |
| MW19-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW21-1D | 5 | * | 13 | 14 | 7.41 |
| MW22-1D | 15 | | 0.5 | 0.5 | 0.00 |
| MW24-1D | 25 | * | 20 | 22 | 9.52 |
| MW25-2I | 35-37 | * | 20 | 22 | 9.52 |
| MW26-2I | 39 | | 0.5 | 0.5 | 0.00 |
| MW26-2I | 39 | * | 4.3 | 3.9 | 9.76 |
| MW27-1B | 129-130 | * | 14 | 18 | 25.00 |
| MW27-1B | 206-207 | | 0.5 | 0.5 | 0.00 |
| MW27-1B | 42-43 | | 26 | 30 | 14.29 |
| MW27-2D | 15 | | 22 | 30 | 30.77 |
| MW27-2D | 48 | | 21 | 19 | 10.00 |
| MW27-2D | 62-63 | | 0.5 | 0.5 | 0.00 |
| MW27-3I | 46 | | 9.1 | 9.3 | 2.17 |
| MW28-1B | 160-160.5 | * | 4.5 | 4.1 | 9.30 |
| MW28-1B | 160-160.5 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 19.5-20 | | 3.7 | 4.8 | 25.88 |
| MW28-1B | 247.5-248 | | 0.5 | 0.5 | 0.00 |
| MW28-1B | 81-81.5 | * | 2.7 | 3.2 | 16.95 |
| MW28-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW29-1D | 32-33 | | 3.4 | 5.8 | 52.17 |
| MW33-1D | 0 | * | 14.8 | 17.8 | 18.40 |
| MW33-1D | 10 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 0 | | 0.5 | 0.5 | 0.00 |
| MW34-1D | 5 | * | 15.2 | 16.6 | 8.81 |
| MW35-1D | 5 | * | 22 | 27 | 20.41 |
| MW35-1D | 20 | | 0.5 | 0.5 | 0.00 |
| MW35-1D | 41-42 | | 0.5 | 0.5 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| MW36-1D | 5 | * | 24.1 | 22.8 | 5.54 |
| MW36-1D | 25 | | 0.5 | 0.5 | 0.00 |
| MW36-2I | 53 | * | 20.1 | 19.6 | 2.52 |
| MW37-1D | 35 | | 0.5 | 0.5 | 0.00 |
| MW38-1I | 20 | | 1.1 | 0.78 | 34.04 |
| MW38-1I | 43 | | 0.5 | 0.5 | 0.00 |
| MW39-1D | 10 | | 1.8 | 1.7 | 5.71 |
| MW39-1D | 125 | * | 10.1 | 11.5 | 12.96 |
| PZ14 | 10 | | 0.5 | 0.5 | 0.00 |
| PZ15 | 10 | | 0.5 | 0.5 | 0.00 |
| PZ32 | 0 | * | 0.75 | 0.73 | 2.70 |
| SB03 | 0 | | 0.5 | 0.5 | 0.00 |
| SB03 | 15 | * | 0.5 | 0.5 | 0.00 |
| SB05 | 5 | | 0.5 | 0.5 | 0.00 |
| SB06 | 10 | | 0.5 | 0.5 | 0.00 |
| SB09 | 10 | | 0.5 | 0.5 | 0.00 |
| SB10 | 5 | | 0.5 | 0.5 | 0.00 |
| SB11 | 5 | | 0.5 | 0.5 | 0.00 |
| SB12 | 15 | * | 0.24 | 0.16 | 40.00 |
| SB14 | 5 | | 0.5 | 0.5 | 0.00 |
| SB16 | 10 | | 0.5 | 0.5 | 0.00 |
| SB19 | 10 | | 0.5 | 0.5 | 0.00 |
| SB21 | 10 | | 0.5 | 0.5 | 0.00 |
| SB23 | 20 | | 0.5 | 0.5 | 0.00 |
| SB24 | 15 | | 0.5 | 0.5 | 0.00 |
| SB26 | 13 | | 0.5 | 0.5 | 0.00 |
| SB28 | 0.5 | | 0.5 | 0.5 | 0.00 |
| SB28 | 51 | * | 16.1 | 18.3 | 12.79 |
| SB32 | 5 | | 0.54 | 0.62 | 13.79 |
| SB32 | 46 | * | 0.5 | 15.2 | 187.26 |
| SB33 | 15 | * | 17 | 18.4 | 7.91 |
| SB33 | 35 | | 0.5 | 0.5 | 0.00 |
| SB33 | 48 | * | 20.3 | 19.7 | 3.00 |
| SB34 | 25 | | 24 | 27 | 11.76 |
| SB34 | 43 | | 14 | 16 | 13.33 |
| SB34 | 45 | * | 22.2 | 24.2 | 8.62 |
| SB35 | 35 | | 13 | 15 | 14.29 |
| SB35 | 40 | | 7.1 | 7.7 | 8.11 |
| SB36 | 5 | * | 15.5 | 14.5 | 6.67 |
| SB36 | 10 | | 0.55 | 0.69 | 22.58 |
| SB37 | 5 | * | 16.3 | 13.5 | 18.79 |
| SB37 | 10 | | 0.94 | 1 | 6.19 |
| SB38 | 5 | * | 19 | 19.5 | 2.60 |
| SB38 | 25 | | 0.5 | 0.5 | 0.00 |
| SB38 | 34 | | 0.5 | 0.5 | 0.00 |
| SB38 | 55 | * | 14.2 | 16.8 | 16.77 |
| SB39 | 0 | * | 19.8 | 18.5 | 6.79 |
| SB39 | 10 | | 0.5 | 0.5 | 0.00 |
| SB39 | 20 | | 0.5 | 0.5 | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB39 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 21 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB40 | | 50 | | * | | 16.3 | | 17.1 | | 4.79 |
| SB40 | | 65 | | * | | 16.2 | | 14.9 | | 8.36 |
| SB40 | | 70 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 0 | | * | | 20.9 | | 22.4 | | 6.93 |
| SB41 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB41 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB42 | | 55 | | * | | 15.3 | | 17.8 | | 15.11 |
| SB43 | | 0 | | * | | 25.4 | | 24 | | 5.67 |
| SB43 | | 5 | | | | 1.8 | | 1.7 | | 5.71 |
| SB43 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB44 | | 35 | | | | 21 | | 21 | | 0.00 |
| SB44 | | 45 | | | | 4.7 | | 4.4 | | 6.59 |
| SB45 | | 5 | | | | 3.7 | | 3.8 | | 2.67 |
| SB45 | | 10 | | | | 2.9 | | 3.2 | | 9.84 |
| SB45 | | 35 | | | | 2.2 | | 2.5 | | 12.77 |
| SB45 | | 55 | | * | | 15.4 | | 13.9 | | 10.24 |
| SB46 | | 20 | | | | 25 | | 28 | | 11.32 |
| SB46 | | 44 | | | | 13 | | 11 | | 16.67 |
| SB47 | | 10 | | * | | 31 | | 30 | | 3.28 |
| SB47 | | 45 | | | | 2.7 | | 3.1 | | 13.79 |
| SB48 | | 0 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 10 | | | | 4.4 | | 4.1 | | 7.06 |
| SB48 | | 52 | | | | 0.5 | | 0.5 | | 0.00 |
| SB48 | | 53 | | * | | 18 | | 18 | | 0.00 |
| SB49 | | 35 | | | | 37 | | 32 | | 14.49 |
| SB49 | | 45 | | | | 12 | | 14 | | 15.38 |
| SB50 | | 30 | | * | | 21.7 | | 22.9 | | 5.38 |
| SB50 | | 55 | | | | 0.89 | | 0.98 | | 9.63 |
| SB51 | | 35 | | | | 7.6 | | 8.5 | | 11.18 |
| SB51 | | 65 | | | | 0.2 | | 0.36 | | 57.14 |
| SB52 | | 35 | | | | 4.6 | | 4.6 | | 0.00 |
| SB52 | | 50 | | | | 0.5 | | 0.5 | | 0.00 |
| SB53 | | 30 | | | | 22 | | 25 | | 12.77 |
| SB53 | | 50 | | | | 18 | | 17 | | 5.71 |
| SB53 | | 80 | | * | | 19.6 | | 19.9 | | 1.52 |
| SB54 | | 25 | | | | 9.4 | | 10 | | 6.19 |
| SB54 | | 35 | | | | 4.3 | | 3.6 | | 17.72 |
| SB54 | | 80 | | * | | 16.3 | | 19.8 | | 19.39 |
| SB54 | | 85 | | * | | 13.4 | | 17 | | 23.68 |
| SB54 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 20 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB56 | | 55 | | * | | 14.6 | | 18.2 | | 21.95 |
| SB56 | | 85 | | * | | 15.1 | | 14.1 | | 6.85 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB57 | | 40 | | | | 1.3 | | 1.5 | | 14.29 |
| SB57 | | 50 | | | | 2.1 | | 2.6 | | 21.28 |
| SB57 | | 50 | | * | | 24.2 | | 25.2 | | 4.05 |
| SB57 | | 65 | | | | 1.8 | | 2.5 | | 32.56 |
| SB58 | | 5 | | | | 2.1 | | 1.9 | | 10.00 |
| SB58 | | 35 | | | | 20 | | 23 | | 13.95 |
| SB58 | | 65 | | | | 18 | | 17 | | 5.71 |
| SB58 | | 80 | | * | | 21.5 | | 21.8 | | 1.39 |
| SB59 | | 30 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 60 | | | | 0.5 | | 0.5 | | 0.00 |
| SB59 | | 95 | | * | | 28 | | 28.4 | | 1.42 |
| SB60 | | 20 | | | | 4.5 | | 5.4 | | 18.18 |
| SB60 | | 25 | | | | 3.8 | | 3.9 | | 2.60 |
| SB60 | | 30 | | | | 4.4 | | 5.1 | | 14.74 |
| SB60 | | 70 | | * | | 19 | | 20.5 | | 7.59 |
| SB61 | | 25 | | | | 4.6 | | 5 | | 8.33 |
| SB61 | | 50 | | | | 5.1 | | 5.9 | | 14.55 |
| SB61 | | 80 | | * | | 21.3 | | 20 | | 6.30 |
| SB62 | | 60 | | * | | 19.9 | | 21.7 | | 8.65 |
| SB62 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB62 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 35 | | | | 2.5 | | 2.8 | | 11.32 |
| SB63 | | 50 | | | | 1.2 | | 1.4 | | 15.38 |
| SB63 | | 70 | | | | 0.5 | | 0.5 | | 0.00 |
| SB63 | | 80 | | * | | 18.3 | | 18.3 | | 0.00 |
| SB63 | | 90 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 5 | | | | 0.5 | | 0.5 | | 0.00 |
| SB64 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB65 | | 40 | | | | 7.7 | | 7.8 | | 1.29 |
| SB65 | | 45 | | | | 8 | | 10 | | 22.22 |
| SB65 | | 85 | | * | | 19.4 | | 20.7 | | 6.48 |
| SB66 | | 15 | | * | | 13.6 | | 12.7 | | 6.84 |
| SB66 | | 35 | | | | 2.3 | | 2.3 | | 0.00 |
| SB66 | | 40 | | | | 2.4 | | 2.7 | | 11.76 |
| SB67 | | 11 | | * | | 11 | | 11 | | 0.00 |
| SB67 | | 25 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 45 | | | | 0.5 | | 0.5 | | 0.00 |
| SB67 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB68 | | 55 | | * | | 11 | | 11 | | 0.00 |
| SB69 | | 0 | | * | | 10.6 | | 9.4 | | 12.00 |
| SB69 | | 30 | | | | 8.1 | | 8.1 | | 0.00 |
| SB69 | | 45 | | | | 5.4 | | 4.3 | | 22.68 |
| SB70 | | 40 | | * | | 10.7 | | 11.3 | | 5.45 |
| SB70 | | 45 | | | | 2 | | 1.9 | | 5.13 |
| SB70 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB71 | | 25 | | | | 6.3 | | 8 | | 23.78 |
| SB71 | | 45 | | | | 8.1 | | 9.8 | | 18.99 |
| SB71 | | 55 | | * | | 5.9 | | 7.4 | | 22.56 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SB72 | | 45 | | | | 0.86 | | 1 | | 15.05 |
| SB72 | | 45 | | * | | 8.9 | | 8.3 | | 6.98 |
| SB72 | | 75 | | * | | 6.7 | | 7.5 | | 11.27 |
| SB73 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB73 | | 35 | | | | 0.5 | | 0.5 | | 0.00 |
| SB73 | | 40 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB74 | | 35 | | | | 3.5 | | 3.5 | | 0.00 |
| SB74 | | 40 | | | | 1 | | 0.89 | | 11.64 |
| SB76 | | 10 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 15 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 60 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 65 | | | | 0.5 | | 0.5 | | 0.00 |
| SB76 | | 80 | | | | 0.5 | | 0.5 | | 0.00 |
| SB77 | | 25 | | | | 4 | | 4.2 | | 4.88 |
| SB77 | | 40 | | | | 1.1 | | 1 | | 9.52 |
| SB77 | | 50 | | | | 1.3 | | 1.4 | | 7.41 |
| SB77 | | 55 | | | | 0.5 | | 0.5 | | 0.00 |

**APPENDIX C**
**Data Sheets for Percent Recovery Calculations--Water**

FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR BENZENE IN WATER

(Concentrations in micrograms per liter)

%R = Percent Recovery

| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
|---|---|---|---|---|---|---|
| MW10-1D | MS | 36-40 | 0.5 | 50 | 77 | 153 |
| MW10-1D | MSD | | 0.5 | 50 | 69 | 137 |
| PZ14 | MS | 11-13 | 0.53 | 50 | 53 | 104.94 |
| PZ14 | MSD | | 0.53 | 50 | 52 | 102.94 |
| MW26-1I | MS | 39-43 | 0.5 | 50 | 21.8 | 42.6 |
| MW26-1I | MSD | | 0.5 | 50 | 23.1 | 45.2 |
| MW24-1D | MS | 14-17 | 0.87 | 50 | 49 | 96.26 |
| MW24-1D | MSD | | 0.87 | 50 | 50 | 98.26 |
| MW17-2D | MS | 68-70 | 0.5 | 50 | 51 | 101 |
| MW17-2D | MSD | | 0.5 | 50 | 53 | 105 |
| MW05-3D | MS | 53-55 | 0.5 | 50 | 50 | 99 |
| MW05-3D | MSD | | 0.5 | 50 | 57 | 113 |
| MW33-1D | MS | 31-33 | 0.5 | 50 | 54 | 107 |
| MW33-1D | MSD | | 0.5 | 50 | 54 | 107 |
| MW35-1D | MS | 46-48 | 0.5 | 50 | 50 | 99 |
| MW35-1D | MSD | | 0.5 | 50 | 49 | 97 |
| MW36-1D | MS | 70-72 | 0.5 | 50 | 51.1 | 101.2 |
| MW36-1D | MSD | | 0.5 | 50 | 49.8 | 98.6 |
| SB66 | MS | 33-35 | 0.5 | 50 | 25.3 | 49.6 |
| SB66 | MSD | | 0.5 | 50 | 30.6 | 60.2 |
| MW39-1D | MS | 103-105 | 0.5 | 50 | 48.2 | 95.4 |
| MW39-1D | MSD | | 0.5 | 50 | 45.4 | 89.8 |

## FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR TOLUENE IN WATER

(Concentrations in micrograms per liter)

%R = Percent Recovery

| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
|---|---|---|---|---|---|---|
| MW10-1D | MS | 36-40 | 0.5 | 50 | 72 | 143 |
| MW10-1D | MSD | | 0.5 | 50 | 66 | 131 |
| PZ14 | MS | 11-13 | 0.5 | 50 | 51 | 101 |
| PZ14 | MSD | | 0.5 | 50 | 52 | 103 |
| MW26-1I | MS | 39-43 | 0.5 | 50 | 21.6 | 42.2 |
| MW26-1I | MSD | | 0.5 | 50 | 23.7 | 46.4 |
| MW24-1D | MS | 14-17 | 0.5 | 50 | 48 | 95 |
| MW24-1D | MSD | | 0.5 | 50 | 51 | 101 |
| MW17-2D | MS | 68-70 | 0.5 | 50 | 50 | 99 |
| MW17-2D | MSD | | 0.5 | 50 | 51 | 101 |
| MW05-3D | MS | 53-55 | 0.5 | 50 | 47 | 93 |
| MW05-3D | MSD | | 0.5 | 50 | 53 | 105 |
| MW33-1D | MS | 31-33 | 0.5 | 50 | 55 | 109 |
| MW33-1D | MSD | | 0.5 | 50 | 52 | 103 |
| MW35-1D | MS | 46-48 | 0.5 | 50 | 47 | 93 |
| MW35-1D | MSD | | 0.5 | 50 | 49 | 97 |
| MW36-1D | MS | 70-72 | 0.5 | 50 | 48 | 95 |
| MW36-1D | MSD | | 0.5 | 50 | 51.2 | 101.4 |
| SB66 | MS | 33-35 | 0.5 | 50 | 21.1 | 41.2 |
| SB66 | MSD | | 0.5 | 50 | 24 | 47 |
| MW39-1D | MS | 103-105 | 0.5 | 50 | 46.5 | 92 |
| MW39-1D | MSD | | 0.5 | 50 | 44.4 | 87.8 |

| FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR ETHYLBENZENE IN WATER | | | | | | |
|---|---|---|---|---|---|---|
| (Concentrations in micrograms per liter) | | | | | | |
| %R = Percent Recovery | | | | | | |
| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| MW10-1D | MS | 36-40 | 0.5 | 50 | 61 | 121 |
| MW10-1D | MSD | | 0.5 | 50 | 67 | 133 |
| PZ14 | MS | 11-13 | 0.5 | 50 | 49 | 97 |
| PZ14 | MSD | | 0.5 | 50 | 46 | 91 |
| MW26-1I | MS | 39-43 | 0.5 | 50 | 20.2 | 39.4 |
| MW26-1I | MSD | | 0.5 | 50 | 23.4 | 45.8 |
| MW24-1D | MS | 14-17 | 0.5 | 50 | 52 | 103 |
| MW24-1D | MSD | | 0.5 | 50 | 54 | 107 |
| MW17-2D | MS | 68-70 | 0.5 | 50 | 50 | 99 |
| MW17-2D | MSD | | 0.5 | 50 | 49 | 97 |
| MW05-3D | MS | 53-55 | 0.5 | 50 | 45 | 89 |
| MW05-3D | MSD | | 0.5 | 50 | 52 | 103 |
| MW33-1D | MS | 31-33 | 0.5 | 50 | 57 | 113 |
| MW33-1D | MSD | | 0.5 | 50 | 54 | 107 |
| MW35-1D | MS | 46-48 | 0.5 | 50 | 49 | 97 |
| MW35-1D | MSD | | 0.5 | 50 | 48 | 95 |
| MW36-1D | MS | 70-72 | 0.5 | 50 | 52.4 | 103.8 |
| MW36-1D | MSD | | 0.5 | 50 | 54.7 | 108.4 |
| SB66 | MS | 33-35 | 0.5 | 50 | 21.1 | 41.2 |
| SB66 | MSD | | 0.5 | 50 | 27.4 | 53.8 |
| MW39-1D | MS | 103-105 | 0.5 | 50 | 46.4 | 91.8 |
| MW39-1D | MSD | | 0.5 | 50 | 42.2 | 83.4 |

| FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR O-XYLENE IN WATER | | | | | | |
|---|---|---|---|---|---|---|
| (Concentrations in micrograms per liter) | | | | | | |
| %R = Percent Recovery | | | | | | |
| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| MW10-1D | MS | 36-40 | 0.5 | 50 | 55 | 109 |
| MW10-1D | MSD | | 0.5 | 50 | 62 | 123 |
| PZ14 | MS | 11-13 | 0.5 | 50 | 56 | 111 |
| PZ14 | MSD | | 0.5 | 50 | 57 | 113 |
| MW26-1I | MS | 39-43 | 0.5 | 50 | 38.4 | 75.8 |
| MW26-1I | MSD | | 0.5 | 50 | 44.9 | 88.8 |
| MW24-1D | MS | 14-17 | 0.5 | 50 | 105 | 209 |
| MW24-1D | MSD | | 0.5 | 50 | 104 | 207 |
| MW17-2D | MS | 68-70 | 0.5 | 50 | 97 | 193 |
| MW17-2D | MSD | | 0.5 | 50 | 86 | 171 |
| MW05-3D | MS | 53-55 | 0.5 | 50 | 41 | 81 |
| MW05-3D | MSD | | 0.5 | 50 | 53 | 105 |
| MW33-1D | MS | 31-33 | 0.5 | 50 | 58 | 115 |
| MW33-1D | MSD | | 0.5 | 50 | 54 | 107 |
| MW35-1D | MS | 46-48 | 0.5 | 50 | 49 | 97 |
| MW35-1D | MSD | | 0.5 | 50 | 49 | 97 |
| MW36-1D | MS | 70-72 | 0.5 | 50 | 53.3 | 105.6 |
| MW36-1D | MSD | | 0.5 | 50 | 58.9 | 116.8 |
| SB66 | MS | 33-35 | 0.5 | 50 | 22.3 | 43.6 |
| SB66 | MSD | | 0.5 | 50 | 27.2 | 53.4 |
| MW39-1D | MS | 103-105 | 0.5 | 50 | 48.1 | 95.2 |
| MW39-1D | MSD | | 0.5 | 50 | 44.8 | 88.6 |

| FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR CHLOROFORM IN WATER | | | | | | |
|---|---|---|---|---|---|---|
| (Concentrations in micrograms per liter) | | | | | | |
| %R = Percent Recovery | | | | | | |
| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| MW10-1D | MS | 36-40 | 0.2 | 10 | 12 | 118 |
| MW10-1D | MSD | | 0.2 | 10 | 11 | 108 |
| PZ14 | MS | 11-13 | 1.1 | 10 | 8.3 | 72 |
| PZ14 | MSD | | 1.1 | 10 | 8.1 | 70 |
| MW26-1I | MS | 39-43 | 0.2 | 10 | 4 | 38 |
| MW26-1I | MSD | | 0.2 | 10 | 4.3 | 41 |
| MW24-1D | MS | 14-17 | 0.23 | 10 | 8.1 | 78.7 |
| MW24-1D | MSD | | 0.23 | 10 | 8.6 | 83.7 |
| MW17-2D | MS | 68-70 | 0.2 | 10 | 8.6 | 84 |
| MW17-2D | MSD | | 0.2 | 10 | 9.1 | 89 |
| MW05-3D | MS | 53-55 | 1.1 | 10 | 10.2 | 91 |
| MW05-3D | MSD | | 1.1 | 10 | 10.2 | 91 |
| MW33-1D | MS | 31-33 | 0.2 | 10 | 9 | 88 |
| MW33-1D | MSD | | 0.2 | 10 | 8.6 | 84 |
| MW35-1D | MS | 46-48 | 0.2 | 10 | 8.6 | 84 |
| MW35-1D | MSD | | 0.2 | 10 | 8.5 | 83 |
| MW36-1D | MS | 70-72 | 0.2 | 10 | 8.8 | 86 |
| MW36-1D | MSD | | 0.2 | 10 | 9 | 88 |
| SB66 | MS | 33-35 | 0.42 | 10 | 5.2 | 47.8 |
| SB66 | MSD | | 0.42 | 10 | 5.4 | 49.8 |
| MW39-1D | MS | 103-105 | 0.2 | 10 | 9.4 | 92 |
| MW39-1D | MSD | | 0.2 | 10 | 8.1 | 79 |

| FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR 1,1,1-TCA IN WATER | | | | | | |
|---|---|---|---|---|---|---|
| (Concentrations in micrograms per liter) | | | | | | |
| %R = Percent Recovery | | | | | | |
| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| MW10-1D | MS | 36-40 | 0.2 | 10 | 11 | 108 |
| MW10-1D | MSD | | 0.2 | 10 | 9.8 | 96 |
| PZ14 | MS | 11-13 | 0.65 | 10 | 7.8 | 71.5 |
| PZ14 | MSD | | 0.65 | 10 | 8.2 | 75.5 |
| MW26-1I | MS | 39-43 | 0.2 | 10 | 3.2 | 30 |
| MW26-1I | MSD | | 0.2 | 10 | 4.3 | 41 |
| MW24-1D | MS | 14-17 | 0.48 | 10 | 8.1 | 76.2 |
| MW24-1D | MSD | | 0.48 | 10 | 8.4 | 79.2 |
| MW17-2D | MS | 68-70 | 0.2 | 10 | 7.8 | 76 |
| MW17-2D | MSD | | 0.2 | 10 | 8.3 | 81 |
| MW05-3D | MS | 53-55 | 0.45 | 10 | 8.4 | 79.5 |
| MW05-3D | MSD | | 0.45 | 10 | 8.8 | 83.5 |
| MW33-1D | MS | 31-33 | 0.2 | 10 | 8.6 | 84 |
| MW33-1D | MSD | | 0.2 | 10 | 8.4 | 82 |
| MW35-1D | MS | 46-48 | 0.2 | 10 | 7.7 | 75 |
| MW35-1D | MSD | | 0.2 | 10 | 7.8 | 76 |
| MW36-1D | MS | 70-72 | 0.2 | 10 | 8 | 78 |
| MW36-1D | MSD | | 0.2 | 10 | 8.2 | 80 |
| SB66 | MS | 33-35 | 1.1 | 10 | 4.9 | 38 |
| SB66 | MSD | | 1.1 | 10 | 5.4 | 43 |
| MW39-1D | MS | 103-105 | 0.2 | 10 | 9.2 | 90 |
| MW39-1D | MSD | | 0.2 | 10 | 7.8 | 76 |

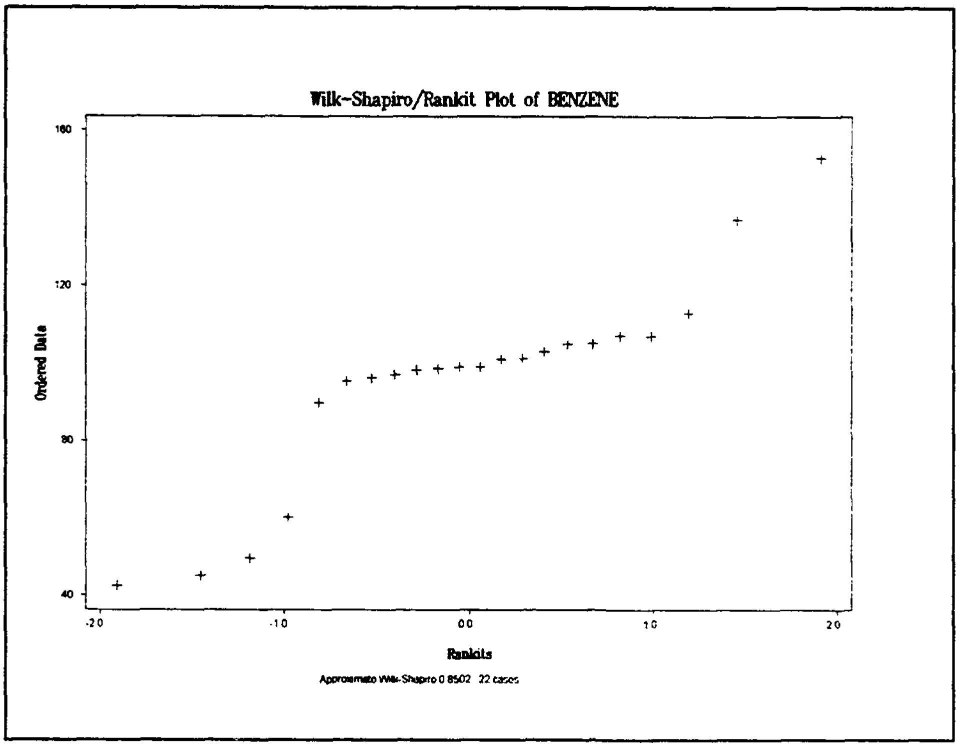
| FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR CARBON TETRACHLORIDE IN WATER | | | | | | |
|---|---|---|---|---|---|---|
| (Concentrations in micrograms per liter) | | | | | | |
| %R = Percent Recovery | | | | | | |
| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| MW10-1D | MS | 36-40 | 0.2 | 5 | 6.5 | 126 |
| MW10-1D | MSD | | 0.2 | 5 | 5.8 | 112 |
| PZ14 | MS | 11-13 | 0.2 | 5 | 3.8 | 72 |
| PZ14 | MSD | | 0.2 | 5 | 4.1 | 78 |
| MW26-1I | MS | 39-43 | 0.2 | 5 | 1.7 | 30 |
| MW26-1I | MSD | | 0.2 | 5 | 2.4 | 44 |
| MW24-1D | MS | 14-17 | 0.2 | 5 | 4.8 | 92 |
| MW24-1D | MSD | | 0.2 | 5 | 4.9 | 94 |
| MW17-2D | MS | 68-70 | 0.2 | 5 | 4.6 | 88 |
| MW17-2D | MSD | | 0.2 | 5 | 4.9 | 94 |
| MW05-3D | MS | 53-55 | 0.2 | 5 | 4.6 | 88 |
| MW05-3D | MSD | | 0.2 | 5 | 5.1 | 98 |
| MW33-1D | MS | 31-33 | 0.2 | 5 | 5.1 | 98 |
| MW33-1D | MSD | | 0.2 | 5 | 5.2 | 100 |
| MW35-1D | MS | 46-48 | 0.2 | 5 | 4.7 | 90 |
| MW35-1D | MSD | | 0.2 | 5 | 4.7 | 90 |
| MW36-1D | MS | 70-72 | 0.3 | 5 | 5.1 | 96 |
| MW36-1D | MSD | | 0.3 | 5 | 5.2 | 98 |
| SB66 | MS | 33-35 | 0.2 | 5 | 2.4 | 44 |
| SB66 | MSD | | 0.2 | 5 | 2.5 | 46 |
| MW39-1D | MS | 103-105 | 0.2 | 5 | 5.1 | 98 |
| MW39-1D | MSD | | 0.2 | 5 | 4.6 | 88 |

| FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR TCE IN WATER | | | | | |
|---|---|---|---|---|---|
| (Concentrations in micrograms per liter) | | | | | |
| %R = Percent Recovery | | | | | |
| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| MW10-1D | MS | 36-40 | 0.2 | 10 | 11 | 108 |
| MW10-1D | MSD | | 0.2 | 10 | 11 | 108 |
| PZ14 | MS | 11-13 | 0.2 | 10 | 8.1 | 79 |
| PZ14 | MSD | | 0.2 | 10 | 8.7 | 85 |
| MW26-1I | MS | 39-43 | 0.2 | 10 | 3.8 | 36 |
| MW26-1I | MSD | | 0.2 | 10 | 4.6 | 44 |
| MW24-1D | MS | 14-17 | 0.2 | 10 | 7.7 | 75 |
| MW24-1D | MSD | | 0.2 | 10 | 8.3 | 81 |
| MW17-2D | MS | 68-70 | 0.2 | 10 | 8.4 | 82 |
| MW17-2D | MSD | | 0.2 | 10 | 8.8 | 86 |
| MW05-3D | MS | 53-55 | 0.2 | 10 | 8.4 | 82 |
| MW05-3D | MSD | | 0.2 | 10 | 9.3 | 91 |
| MW33-1D | MS | 31-33 | 0.2 | 10 | 9.2 | 90 |
| MW33-1D | MSD | | 0.2 | 10 | 8.8 | 86 |
| MW35-1D | MS | 46-48 | 0.2 | 10 | 8.4 | 82 |
| MW35-1D | MSD | | 0.2 | 10 | 8.5 | 83 |
| MW36-1D | MS | 70-72 | 1.2 | 10 | 10 | 88 |
| MW36-1D | MSD | | 1.2 | 10 | 10.1 | 89 |
| SB66 | MS | 33-35 | 4.5 | 10 | 7.4 | 29 |
| SB66 | MSD | | 4.5 | 10 | 8.5 | 40 |
| MW39-1D | MS | 103-105 | 0.2 | 10 | 9.4 | 92 |
| MW39-1D | MSD | | 0.2 | 10 | 8.2 | 80 |

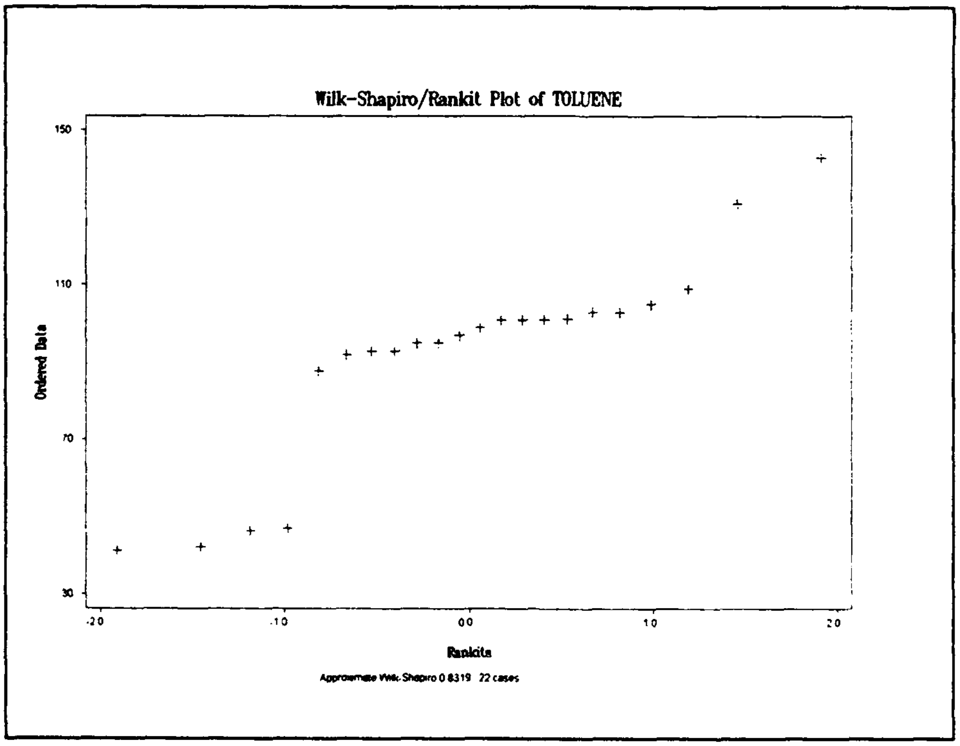
| FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR PCE IN WATER | | | | | | |
|---|---|---|---|---|---|---|
| (Concentrations in micrograms per liter) | | | | | | |
| %R = Percent Recovery | | | | | | |
| Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| MW10-1D | MS | 36-40 | 0.2 | 5 | 13 | 256 |
| MW10-1D | MSD | | 0.2 | 5 | 12 | 236 |
| PZ14 | MS | 11-13 | 0.2 | 5 | 6.3 | 122 |
| PZ14 | MSD | | 0.2 | 5 | 6.9 | 134 |
| MW26-1I | MS | 39-43 | 0.2 | 5 | 2 | 36 |
| MW26-1I | MSD | | 0.2 | 5 | 2.5 | 46 |
| MW24-1D | MS | 14-17 | 0.2 | 5 | 4.8 | 92 |
| MW24-1D | MSD | | 0.2 | 5 | 5 | 96 |
| MW17-2D | MS | 68-70 | 0.2 | 5 | 4.7 | 90 |
| MW17-2D | MSD | | 0.2 | 5 | 5 | 96 |
| MW05-3D | MS | 53-55 | 0.2 | 5 | 4.3 | 82 |
| MW05-3D | MSD | | 0.2 | 5 | 4.9 | 94 |
| MW33-1D | MS | 31-33 | 0.2 | 5 | 5.4 | 104 |
| MW33-1D | MSD | | 0.2 | 5 | 5.3 | 102 |
| MW35-1D | MS | 46-48 | 0.2 | 5 | 4.6 | 88 |
| MW35-1D | MSD | | 0.2 | 5 | 4.9 | 94 |
| MW36-1D | MS | 70-72 | 0.2 | 5 | 5.1 | 98 |
| MW36-1D | MSD | | 0.2 | 5 | 5.1 | 98 |
| SB66 | MS | 33-35 | 1.3 | 5 | 3.4 | 42 |
| SB66 | MSD | | 1.3 | 5 | 4.1 | 56 |
| MW39-1D | MS | 103-105 | 0.2 | 5 | 5.5 | 106 |
| MW39-1D | MSD | | 0.2 | 5 | 4.6 | 88 |

**APPENDIX D**

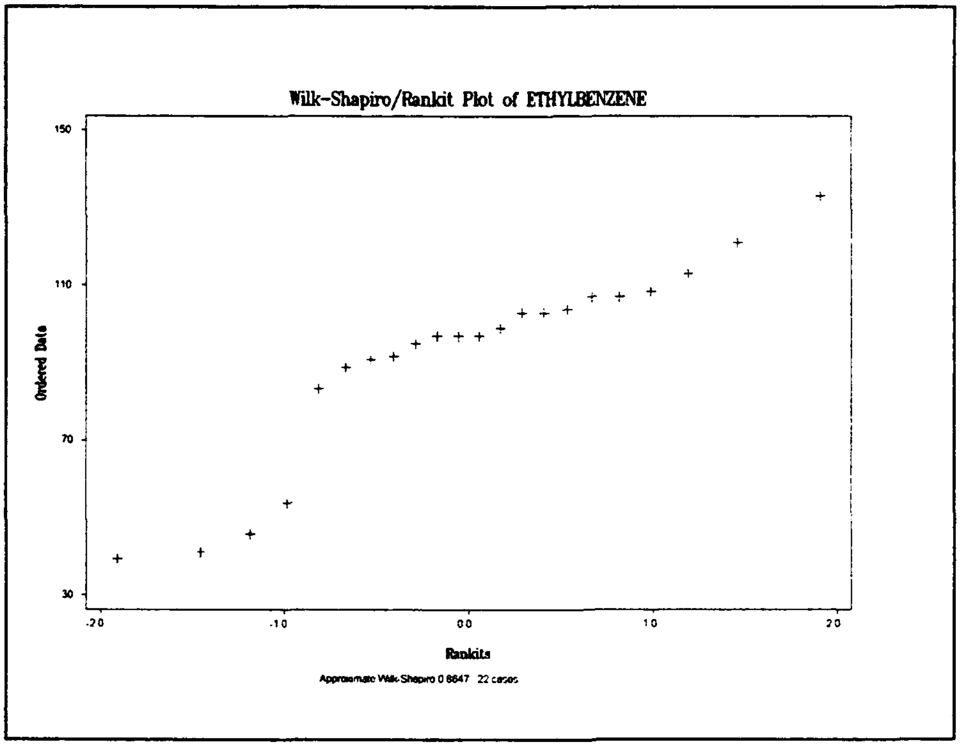
**Wilk-Shapiro Results of Percent Recovery Values in Water Data**



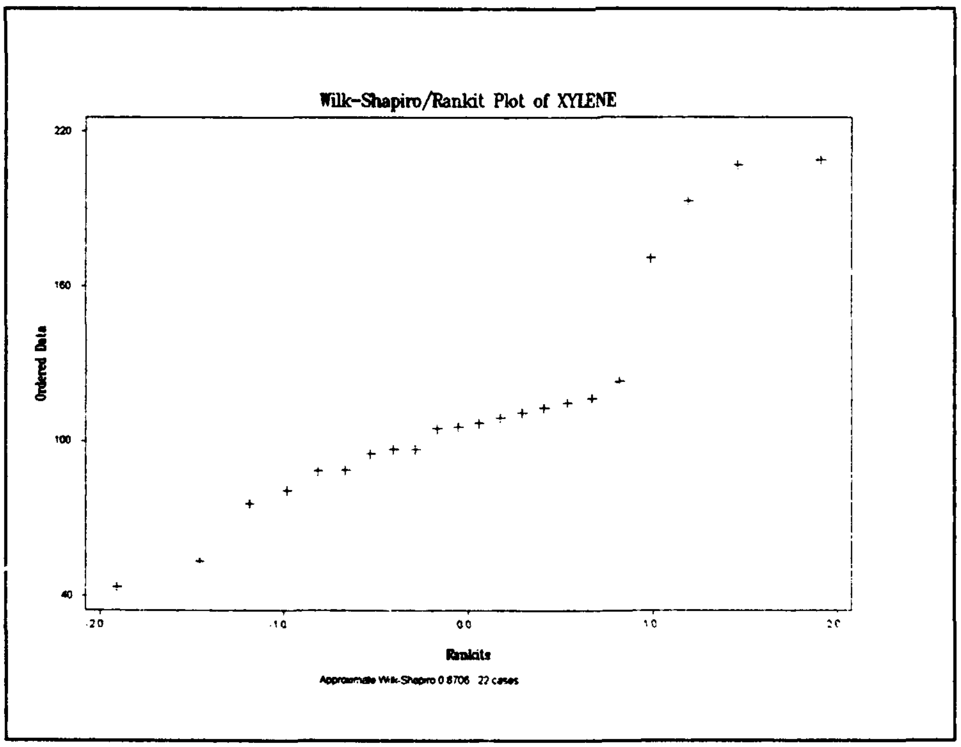
Wilk-Shapiro/Rankit Plot of BENZENE
160
120
80
40
Ordered Data
-2.0
-1.0
0.0
1.0
2.0
Rankits
Approximate Wilk-Shapiro 0.8502 22 cases

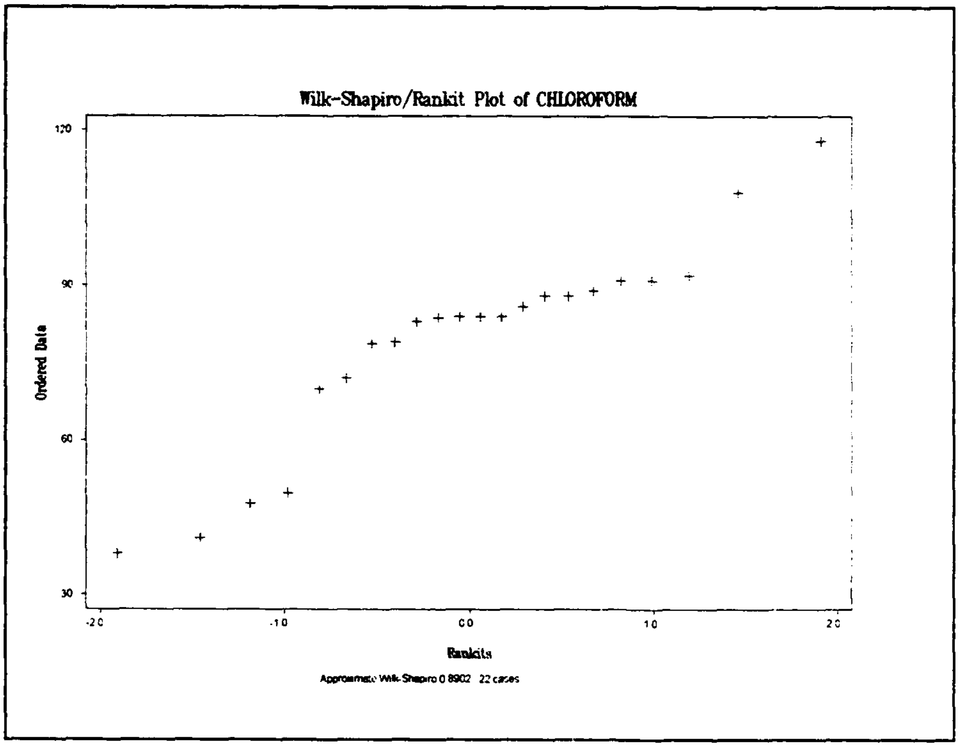
Wilk-Shapiro/Rankit Plot of TOLUENE
150
110
70
30
Ordered Data
-2.0
-1.0
0.0
1.0
2.0
Rankits
Approximate Wilk-Shapiro 0.8319 22 cases

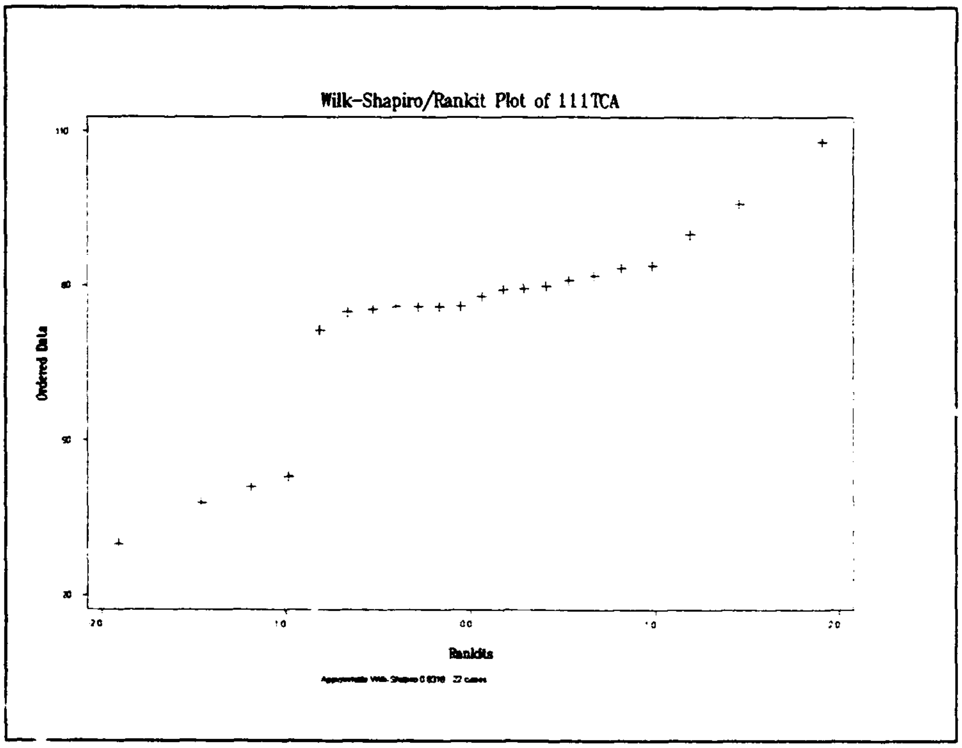


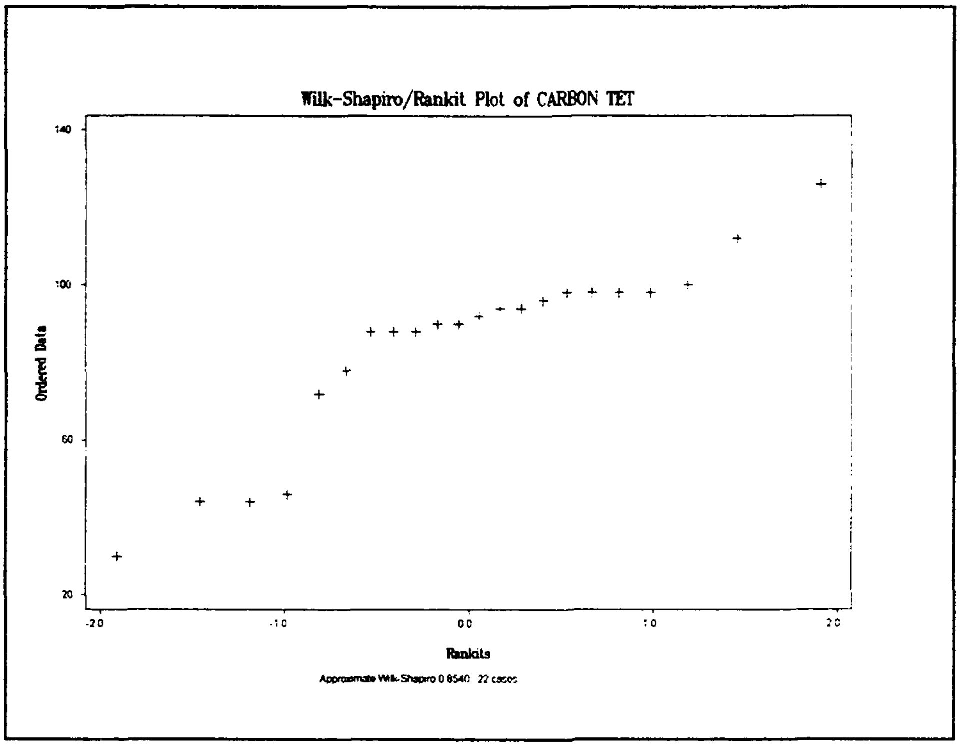
Wilk-Shapiro/Rankit Plot of ETHYLBENZENE
Ordered Data
150
110
70
30
-2.0
-1.0
0.0
1.0
2.0
Rankits
Approximate Wilk-Shapiro 0.8647 22 cases

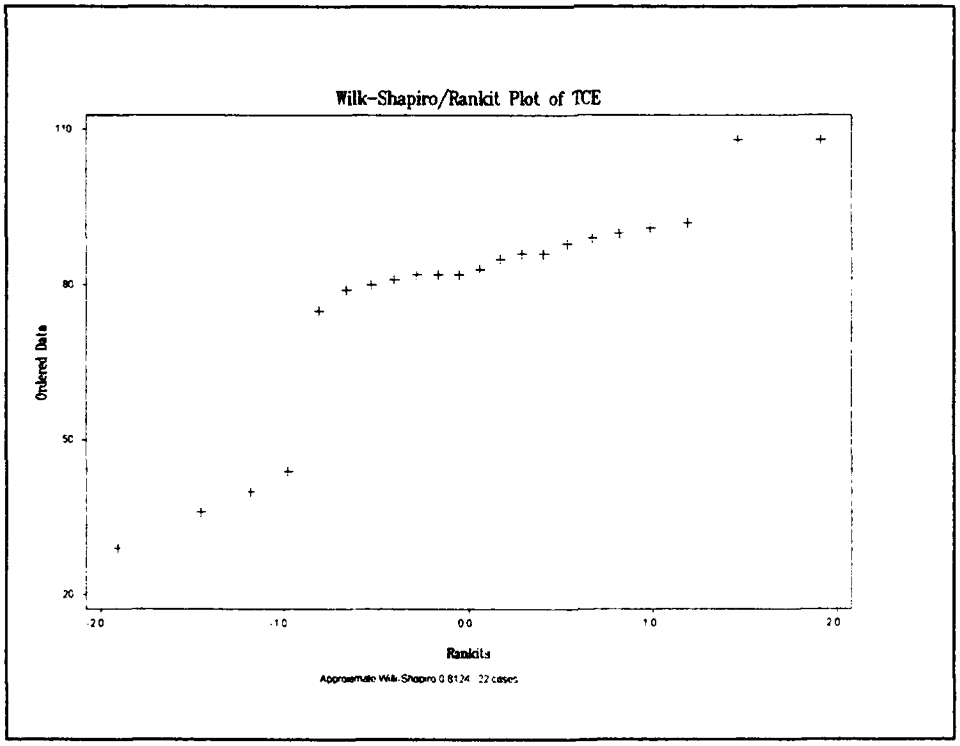



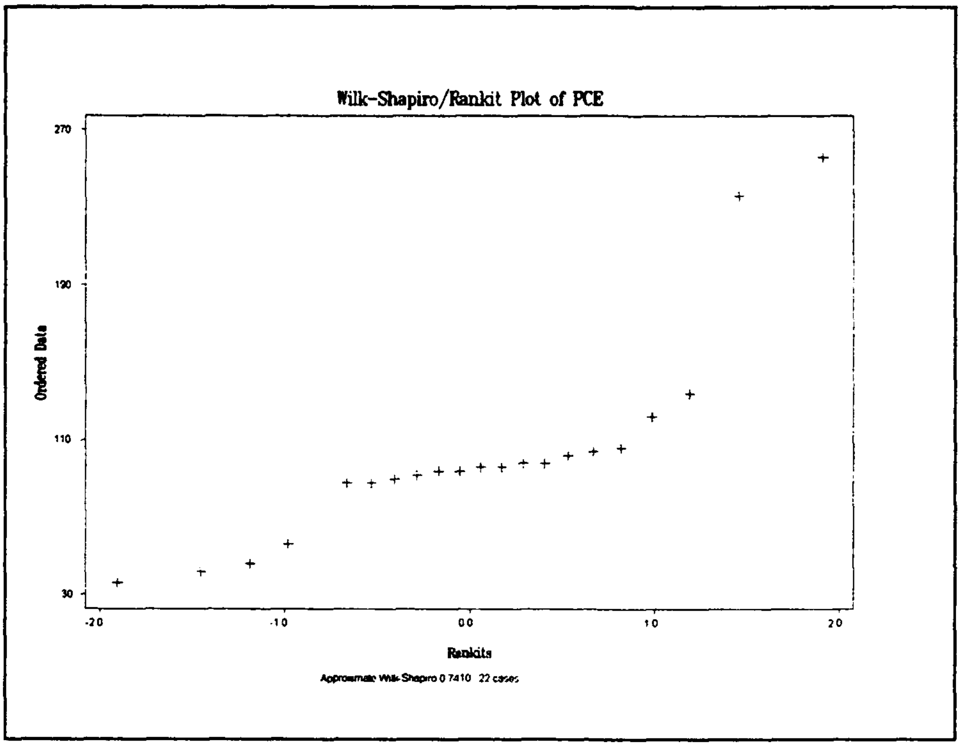
Wilk-Shapiro/Rankit Plot of XYLENE
Ordered Data
220
160
100
40
-2.0
-1.0
0.0
1.0
2.0
Rankits
Approximate Wilk-Shapiro 0.8706 22 cases


Wilk-Shapiro/Rankit Plot of CHLOROFORM
Ordered Data
Rankits
120
90
60
30
-2.0
-1.0
0.0
1.0
2.0
Approximate Wilk-Shapiro 0.8902 22 cases


Wilk-Shapiro/Rankit Plot of 111TCA
Ordered Data
Rankits


Wilk-Shapiro/Rankit Plot of CARBON TET
140
100
60
20
Ordered Data
-2.0
-1.0
0.0
1.0
2.0
Rankits
Approximate Wilk-Shapiro 0.8540 22 cases


Wilk-Shapiro/Rankit Plot of TCE
110
80
50
20
Ordered Data
-2.0
-1.0
0.0
1.0
2.0
Rankits
Approximate Wilk-Shapiro 0.8124 22 cases


Wilk-Shapiro/Rankit Plot of PCE
270
190
110
30
Ordered Data
-2.0
-1.0
0.0
1.0
2.0
Rankits
Approximate Wilk-Shapiro 0.7410 22 cases

**APPENDIX E**
**Data Sheets for Percent Recovery Calculations--Soil**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR BENZENE IN SOILS | | | | | | |
| | (Concentrations in micrograms per kilogram) | | | | | | |
| | %R = Percent recovery | | | | | | |
| Date | Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| 7/29/92 | MW04-1S | MS | 15 | 1 | 75 | 6 | 6.67 |
| 7/29/92 | MW04-1S | MSD | | 1 | 75 | 5.3 | 5.73 |
| 9/12/92 | MW13-2B | MS | 135 | 1 | 75 | 41.6 | 54.13 |
| 9/12/92 | MW13-2B | MSD | | 1 | 75 | 43.4 | 56.53 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 1 | 75 | 40 | 52.00 |
| 9/13/92 | MW13-2B | MSD | | 1 | 75 | 36 | 46.67 |
| 9/14/92 | MW16-1D | MS | 5 | 1.1 | 75 | 47 | 61.20 |
| 9/14/92 | MW16-1D | MSD | | 1.1 | 75 | 45 | 58.53 |
| 9/28/92 | MW17-2D | MS | 30 | 1 | 75 | 170 | 225.33 |
| 9/28/92 | MW17-2D | MSD | | 1 | 75 | 170 | 225.33 |
| 9/30/92 | MW17-2D | MS | 97-98 | 1 | 75 | 190 | 252.00 |
| 9/30/92 | MW17-2D | MSD | | 1 | 75 | 190 | 252.00 |
| 10/26/92 | MW19-1D | MS | 20 | 1 | 75 | 154 | 204.00 |
| 10/26/92 | MW19-1D | MSD | | 1 | 75 | 128 | 169.33 |
| 9/23/92 | MW21-1D | MS | 5 | 140 | 75 | 250 | 146.67 |
| 9/23/92 | MW21-1D | MSD | | 140 | 75 | 280 | 186.67 |
| 9/25/92 | MW24-1D | MS | 25 | 1 | 75 | 170 | 225.33 |
| 9/25/92 | MW24-1D | MSD | | 1 | 75 | 150 | 198.67 |
| 9/1/92 | MW25-2I | MS | 35-37 | 28 | 75 | 207 | 238.67 |
| 9/1/92 | MW25-2I | MSD | | 28 | 75 | 238 | 280.00 |
| 9/11/92 | MW26-2I | MS | 39 | 1 | 75 | 37 | 48.00 |
| 9/11/92 | MW26-2I | MSD | | 1 | 75 | 35 | 45.33 |
| 9/24/92 | MW27-1B | MS | 129-130 | 1 | 75 | 130 | 172.00 |
| 9/24/92 | MW27-1B | MSD | | 1 | 75 | 150 | 198.67 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 1 | 75 | 35.7 | 46.27 |
| 9/15/92 | MW28-1B | MSD | | 1 | 75 | 36.4 | 47.20 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 3.9 | 75 | 25.3 | 28.53 |
| 9/15/92 | MW28-1B | MSD | | 3.9 | 75 | 26.6 | 30.27 |
| 10/27/92 | MW33-1D | MS | 0 | 1 | 75 | 164 | 217.33 |
| 10/27/92 | MW33-1D | MSD | | 1 | 75 | 165 | 218.67 |
| 11/2/92 | MW34-1D | MS | 5 | 1 | 75 | 151 | 200.00 |
| 11/2/92 | MW34-1D | MSD | | 1 | 75 | 162 | 214.67 |
| 11/4/92 | MW35-1D | MS | 5 | 1 | 75 | 242 | 321.33 |
| 11/4/92 | MW35-1D | MSD | | 1 | 75 | 267 | 354.67 |
| 12/15/92 | MW36-1D | MS | 5 | 3.3 | 75 | 248 | 326.27 |
| 12/15/92 | MW36-1D | MSD | | 3.3 | 75 | 241 | 316.93 |
| 12/17/92 | MW36-2I | MS | 53 | 1 | 75 | 220 | 292.00 |
| 12/17/92 | MW36-2I | MSD | | 1 | 75 | 213 | 282.67 |
| 1/7/93 | MW39-1D | MS | 125 | 1 | 75 | 77 | 101.33 |
| 1/7/93 | MW39-1D | MSD | | 1 | 75 | 85 | 112.00 |
| 8/27/92 | PZ32 | MS | 0 | 1 | 75 | 4.8 | 5.07 |
| 8/27/92 | PZ32 | MSD | | 1 | 75 | 6.4 | 7.20 |
| 7/18/92 | SB03 | MS | 15 | 1 | 75 | 1.4 | 0.53 |
| 7/18/92 | SB03 | MSD | | 1 | 75 | 3.7 | 3.60 |
| 7/21/92 | SB12 | MS | 15 | 1 | 75 | 3.8 | 3.73 |
| 7/21/92 | SB12 | MSD | | 1 | 75 | 2 | 1.33 |
| 11/19/92 | SB28 | MS | 51 | 1 | 75 | 123 | 162.67 |
| 11/19/92 | SB28 | MSD | | 1 | 75 | 139 | 184.00 |
| 11/8/92 | SB32 | MS | 46 | 1 | 75 | 124 | 164.00 |
| 11/8/92 | SB32 | MSD | | 1 | 75 | 127 | 168.00 |
| 11/8/92 | SB33 | MS | 15 | 1.4 | 75 | 99 | 130.13 |
| 11/8/92 | SB33 | MSD | | 1.4 | 75 | 123 | 162.13 |
| 11/8/92 | SB33 | MS | 48 | 1 | 75 | 168 | 222.67 |
| 11/8/92 | SB33 | MSD | | 1 | 75 | 147 | 194.67 |
| 11/7/92 | SB34 | MS | 45 | 1 | 75 | 152 | 201.33 |
| 11/7/92 | SB34 | MSD | | 1 | 75 | 167 | 221.33 |
| 10/21/92 | SB36 | MS | 5 | 1 | 75 | 177 | 234.67 |
| 10/21/92 | SB36 | MSD | | 1 | 75 | 158 | 209.33 |
| 10/21/92 | SB37 | MS | 5 | 1 | 75 | 202 | 268.00 |
| 10/21/92 | SB37 | MSD | | 1 | 75 | 166 | 220.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 1.5 | 75 | 224 | 296.67 |
| 10/25/92 | SB38 | MSD | | 1.5 | 75 | 214 | 283.33 |
| 10/25/92 | SB38 | MS | 55 | 1 | 75 | 172 | 228.00 |
| 10/25/92 | SB38 | MSD | | 1 | 75 | 177 | 234.67 |
| 10/23/92 | SB39 | MS | 0 | 1 | 75 | 204 | 270.67 |
| 10/23/92 | SB39 | MSD | | 1 | 75 | 181 | 240.00 |
| 10/22/92 | SB40 | MS | 65 | 1 | 75 | 208 | 276.00 |
| 10/22/92 | SB40 | MSD | | 1 | 75 | 184 | 244.00 |
| 10/24/92 | SB41 | MS | 0 | 1 | 75 | 248 | 329.33 |
| 10/24/92 | SB41 | MSD | | 1 | 75 | 245 | 325.33 |
| 10/23/92 | SB42 | MS | 55 | 1 | 75 | 172 | 228.00 |
| 10/23/92 | SB42 | MSD | | 1 | 75 | 210 | 278.67 |
| 10/24/92 | SB43 | MS | 0 | 1 | 75 | 280 | 372.00 |
| 10/24/92 | SB43 | MSD | | 1 | 75 | 261 | 346.67 |
| 11/9/92 | SB45 | MS | 55 | 1 | 75 | 157 | 208.00 |
| 11/9/92 | SB45 | MSD | | 1 | 75 | 128 | 169.33 |
| 11/10/92 | SB47 | MS | 10 | 1 | 75 | 232 | 308.00 |
| 11/10/92 | SB47 | MSD | | 1 | 75 | 246 | 326.67 |
| 11/11/92 | SB48 | MS | 53 | 1 | 75 | 145 | 192.00 |
| 11/11/92 | SB48 | MSD | | 1 | 75 | 155 | 205.33 |
| 11/17/92 | SB50 | MS | 30 | 1 | 75 | 225 | 298.67 |
| 11/17/92 | SB50 | MSD | | 1 | 75 | 186 | 246.67 |
| 11/20/92 | SB53 | MS | 80 | 1 | 75 | 159 | 210.67 |
| 11/20/92 | SB53 | MSD | | 1 | 75 | 153 | 202.67 |
| 11/21/92 | SB54 | MS | 80 | 1 | 75 | 155 | 205.33 |
| 11/21/92 | SB54 | MSD | | 1 | 75 | 121 | 160.00 |
| 11/21/92 | SB54 | MS | 85 | 1 | 75 | 139 | 184.00 |
| 11/21/92 | SB54 | MSD | | 1 | 75 | 185 | 245.33 |
| 11/23/92 | SB56 | MS | 55 | 1 | 75 | 172 | 228.00 |
| 11/23/92 | SB56 | MSD | | 1 | 75 | 193 | 256.00 |
| 11/23/92 | SB56 | MS | 85 | 1 | 75 | 167 | 221.33 |
| 11/23/92 | SB56 | MSD | | 1 | 75 | 153 | 202.67 |
| 11/24/92 | SB57 | MS | 50 | 1 | 75 | 200 | 265.33 |
| 11/24/92 | SB57 | MSD | | 1 | 75 | 192 | 254.67 |
| 11/30/92 | SB58 | MS | 80 | 1 | 75 | 228 | 302.67 |
| 11/30/92 | SB58 | MSD | | 1 | 75 | 210 | 278.67 |
| 12/1/92 | SB59 | MS | 95 | 1.9 | 75 | 300 | 397.47 |
| 12/1/92 | SB59 | MSD | | 1.9 | 75 | 295 | 390.80 |
| 12/2/92 | SB60 | MS | 70 | 1 | 75 | 218 | 289.33 |
| 12/2/92 | SB60 | MSD | | 1 | 75 | 241 | 320.00 |
| 12/3/92 | SB61 | MS | 80 | 1 | 75 | 222 | 294.67 |
| 12/3/92 | SB61 | MSD | | 1 | 75 | 213 | 282.67 |
| 12/4/92 | SB62 | MS | 60 | 1 | 75 | 196 | 260.00 |
| 12/4/92 | SB62 | MSD | | 1 | 75 | 202 | 268.00 |
| 12/5/92 | SB63 | MS | 80 | 1 | 75 | 191 | 253.33 |
| 12/5/92 | SB63 | MSD | | 1 | 75 | 172 | 228.00 |
| 12/9/92 | SB65 | MS | 85 | 1 | 75 | 183 | 242.67 |
| 12/9/92 | SB65 | MSD | | 1 | 75 | 195 | 258.67 |
| 12/21/92 | SB66 | MS | 15 | 1.2 | 75 | 116 | 153.07 |
| 12/21/92 | SB66 | MSD | | 1.2 | 75 | 131 | 173.07 |
| 3/16/93 | SB67 | MS | 11 | 1 | 75 | 100 | 132.00 |
| 3/16/93 | SB67 | MSD | | 1 | 75 | 100 | 132.00 |
| 3/17/93 | SB68 | MS | 55 | 1 | 75 | 78 | 102.67 |
| 3/17/93 | SB68 | MSD | | 1 | 75 | 75 | 98.67 |
| 3/18/93 | SB69 | MS | 0 | 1 | 75 | 97 | 128.00 |
| 3/18/93 | SB69 | MSD | | 1 | 75 | 86.4 | 113.87 |
| 3/19/93 | SB70 | MS | 40 | 1 | 75 | 76 | 100.00 |
| 3/19/93 | SB70 | MSD | | 1 | 75 | 91 | 120.00 |
| 3/20/93 | SB71 | MS | 55 | 1 | 75 | 41 | 53.33 |
| 3/20/93 | SB71 | MSD | | 1 | 75 | 61 | 80.00 |
| 3/21/93 | SB72 | MS | 45 | 1 | 75 | 84 | 110.67 |
| 3/21/93 | SB72 | MSD | | 1 | 75 | 70 | 92.00 |
| 3/21/93 | SB72 | MS | 75 | 1 | 75 | 55 | 72.00 |
| 3/21/93 | SB72 | MSD | | 1 | 75 | 63 | 82.67 |

| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR TOLUENE IN SOILS (Concentrations in micrograms per kilogram) | | | | | | |
|---|---|---|---|---|---|---|---|
| | %R = Percent recovery | | | | | | |
| Date | Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| 7/29/92 | MW04-1S | MS | 15 | 1 | 75 | 5.9 | 6.53 |
| 7/29/92 | MW04-1S | MSD | | 1 | 75 | 5.8 | 6.40 |
| 9/12/92 | MW13-2B | MS | 135 | 1 | 75 | 40.2 | 52.27 |
| 9/12/92 | MW13-2B | MSD | | 1 | 75 | 43.2 | 56.27 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 1 | 75 | 38 | 49.33 |
| 9/13/92 | MW13-2B | MSD | | 1 | 75 | 37 | 48.00 |
| 9/14/92 | MW16-1D | MS | 5 | 3.1 | 75 | 43 | 53.20 |
| 9/14/92 | MW16-1D | MSD | | 3.1 | 75 | 45 | 55.87 |
| 9/28/92 | MW17-2D | MS | 30 | 1 | 75 | 180 | 238.67 |
| 9/28/92 | MW17-2D | MSD | | 1 | 75 | 180 | 238.67 |
| 9/30/92 | MW17-2D | MS | 97-98 | 1 | 76 | 160 | 212.00 |
| 9/30/92 | MW17-2D | MSD | | 1 | 75 | 170 | 225.33 |
| 10/26/92 | MW19-1D | MS | 20 | 1 | 75 | 132 | 174.67 |
| 10/26/92 | MW19-1D | MSD | | 1 | 75 | 107 | 141.33 |
| 9/23/92 | MW21-1D | MS | 5 | 21 | 75 | 132 | 148.00 |
| 9/23/92 | MW21-1D | MSD | | 21 | 75 | 165 | 192.00 |
| 9/25/92 | MW24-1D | MS | 25 | 1 | 75 | 140 | 185.33 |
| 9/25/92 | MW24-1D | MSD | | 1 | 75 | 150 | 198.67 |
| 9/1/92 | MW25-2I | MS | 35-37 | 12 | 75 | 179 | 222.67 |
| 9/1/92 | MW25-2I | MSD | | 12 | 75 | 203 | 254.67 |
| 9/11/92 | MW26-2I | MS | 39 | 1 | 75 | 40 | 52.00 |
| 9/11/92 | MW26-2I | MSD | | 1 | 75 | 33 | 42.67 |
| 9/24/92 | MW27-1B | MS | 129-130 | 1 | 75 | 100 | 132.00 |
| 9/24/92 | MW27-1B | MSD | | 1 | 75 | 140 | 185.33 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 1 | 75 | 29.3 | 37.73 |
| 9/15/92 | MW28-1B | MSD | | 1 | 75 | 31.6 | 40.80 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 1.8 | 75 | 20 | 24.27 |
| 9/15/92 | MW28-1B | MSD | | 1.8 | 75 | 23 | 28.27 |
| 10/27/92 | MW33-1D | MS | 0 | 1 | 75 | 150 | 198.67 |
| 10/27/92 | MW33-1D | MSD | | 1 | 75 | 151 | 200.00 |
| 11/2/92 | MW34-1D | MS | 5 | 1 | 75 | 133 | 176.00 |
| 11/2/92 | MW34-1D | MSD | | 1 | 75 | 132 | 174.67 |
| 11/4/92 | MW35-1D | MS | 5 | 1.4 | 75 | 200 | 264.80 |
| 11/4/92 | MW35-1D | MSD | | 1.4 | 75 | 244 | 323.47 |
| 12/15/92 | MW36-1D | MS | 5 | 9.6 | 75 | 256 | 328.53 |
| 12/15/92 | MW36-1D | MSD | | 9.6 | 75 | 235 | 300.53 |
| 12/17/92 | MW36-2I | MS | 53 | 1 | 75 | 206 | 273.33 |
| 12/17/92 | MW36-2I | MSD | | 1 | 75 | 195 | 258.67 |
| 1/7/93 | MW39-1D | MS | 125 | 1 | 75 | 58 | 76.00 |
| 1/7/93 | MW39-1D | MSD | | 1 | 75 | 76 | 100.00 |
| 8/27/92 | PZ32 | MS | 0 | 1 | 75 | 5 | 5.33 |
| 8/27/92 | PZ32 | MSD | | 1 | 75 | 6.9 | 7.87 |
| 7/18/92 | SB03 | MS | 15 | 1.3 | 75 | 1.8 | 0.67 |
| 7/18/92 | SB03 | MSD | | 1.3 | 75 | 3 | 2.27 |
| 7/21/92 | SB12 | MS | 15 | 1 | 75 | 4.5 | 4.67 |
| 7/21/92 | SB12 | MSD | | 1 | 75 | 2.8 | 2.40 |
| 11/19/92 | SB28 | MS | 51 | 1 | 75 | 110 | 145.33 |
| 11/19/92 | SB28 | MSD | | 1 | 75 | 109 | 144.00 |
| 11/8/92 | SB32 | MS | 46 | 1 | 75 | 1 | 0.00 |
| 11/8/92 | SB32 | MSD | | 1 | 75 | 110 | 145.33 |
| 11/8/92 | SB33 | MS | 15 | 2.9 | 75 | 95 | 122.80 |
| 11/8/92 | SB33 | MSD | | 2.9 | 75 | 117 | 152.13 |
| 11/8/92 | SB33 | MS | 48 | 1 | 75 | 158 | 209.33 |
| 11/8/92 | SB33 | MSD | | 1 | 75 | 137 | 181.33 |
| 11/7/92 | SB34 | MS | 45 | 1 | 75 | 108 | 142.67 |
| 11/7/92 | SB34 | MSD | | 1 | 75 | 132 | 174.67 |
| 10/21/92 | SB36 | MS | 5 | 1 | 75 | 158 | 209.33 |
| 10/21/92 | SB36 | MSD | | 1 | 75 | 142 | 188.00 |
| 10/21/92 | SB37 | MS | 5 | 1 | 75 | 170 | 225.33 |
| 10/21/92 | SB37 | MSD | | 1 | 75 | 136 | 180.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 2.7 | 75 | 191 | 251.07 |
| 10/25/92 | SB38 | MSD | | 2.7 | 75 | 186 | 244.40 |
| 10/25/92 | SB38 | MS | 55 | 1 | 75 | 130 | 172.00 |
| 10/25/92 | SB38 | MSD | | 1 | 75 | 135 | 178.67 |
| 10/23/92 | SB39 | MS | 0 | 1 | 75 | 194 | 257.33 |
| 10/23/92 | SB39 | MSD | | 1 | 75 | 176 | 233.33 |
| 10/22/92 | SB40 | MS | 65 | 1 | 75 | 168 | 222.67 |
| 10/22/92 | SB40 | MSD | | 1 | 75 | 151 | 200.00 |
| 10/24/92 | SB41 | MS | 0 | 1 | 75 | 198 | 262.67 |
| 10/24/92 | SB41 | MSD | | 1 | 75 | 208 | 276.00 |
| 10/23/92 | SB42 | MS | 55 | 1 | 75 | 168 | 222.67 |
| 10/23/92 | SB42 | MSD | | 1 | 75 | 204 | 270.67 |
| 10/24/92 | SB43 | MS | 0 | 1 | 75 | 242 | 321.33 |
| 10/24/92 | SB43 | MSD | | 1 | 75 | 226 | 300.00 |
| 11/9/92 | SB45 | MS | 55 | 1 | 75 | 105 | 138.67 |
| 11/9/92 | SB45 | MSD | | 1 | 75 | 85 | 112.00 |
| 11/10/92 | SB47 | MS | 10 | 1 | 75 | 205 | 272.00 |
| 11/10/92 | SB47 | MSD | | 1 | 75 | 207 | 274.67 |
| 11/11/92 | SB48 | MS | 53 | 1 | 75 | 114 | 150.67 |
| 11/11/92 | SB48 | MSD | | 1 | 75 | 103 | 136.00 |
| 11/17/92 | SB50 | MS | 30 | 1 | 75 | 197 | 261.33 |
| 11/17/92 | SB50 | MSD | | 1 | 75 | 158 | 209.33 |
| 11/20/92 | SB53 | MS | 80 | 1 | 75 | 133 | 176.00 |
| 11/20/92 | SB53 | MSD | | 1 | 75 | 135 | 178.67 |
| 11/21/92 | SB54 | MS | 80 | 1 | 75 | 131 | 173.33 |
| 11/21/92 | SB54 | MSD | | 1 | 75 | 103 | 136.00 |
| 11/21/92 | SB54 | MS | 85 | 1 | 75 | 116 | 153.33 |
| 11/21/92 | SB54 | MSD | | 1 | 75 | 162 | 214.67 |
| 11/23/92 | SB56 | MS | 55 | 1 | 75 | 168 | 222.67 |
| 11/23/92 | SB56 | MSD | | 1 | 75 | 190 | 252.00 |
| 11/23/92 | SB56 | MS | 85 | 1 | 75 | 155 | 205.33 |
| 11/23/92 | SB56 | MSD | | 1 | 75 | 147 | 194.67 |
| 11/24/92 | SB57 | MS | 50 | 1 | 75 | 203 | 269.33 |
| 11/24/92 | SB57 | MSD | | 1 | 75 | 188 | 249.33 |
| 11/30/92 | SB58 | MS | 80 | 1 | 75 | 220 | 292.00 |
| 11/30/92 | SB58 | MSD | | 1 | 75 | 218 | 289.33 |
| 12/1/92 | SB59 | MS | 95 | 4 | 75 | 285 | 374.67 |
| 12/1/92 | SB59 | MSD | | 4 | 75 | 289 | 380.00 |
| 12/2/92 | SB60 | MS | 70 | 1 | 75 | 191 | 253.33 |
| 12/2/92 | SB60 | MSD | | 1 | 75 | 212 | 281.33 |
| 12/3/92 | SB61 | MS | 80 | 1 | 75 | 215 | 285.33 |
| 12/3/92 | SB61 | MSD | | 1 | 75 | 212 | 281.33 |
| 12/4/92 | SB62 | MS | 60 | 1 | 75 | 191 | 253.33 |
| 12/4/92 | SB62 | MSD | | 1 | 75 | 200 | 265.33 |
| 12/5/92 | SB63 | MS | 80 | 1 | 75 | 181 | 240.00 |
| 12/5/92 | SB63 | MSD | | 1 | 75 | 174 | 230.67 |
| 12/9/92 | SB65 | MS | 85 | 1 | 75 | 173 | 229.33 |
| 12/9/92 | SB65 | MSD | | 1 | 75 | 182 | 241.33 |
| 12/21/92 | SB66 | MS | 15 | 1.2 | 75 | 104 | 137.07 |
| 12/21/92 | SB66 | MSD | | 1.2 | 75 | 116 | 153.07 |
| 3/16/93 | SB67 | MS | 11 | 1 | 75 | 96 | 126.67 |
| 3/16/93 | SB67 | MSD | | 1 | 75 | 96 | 126.67 |
| 3/17/93 | SB68 | MS | 55 | 1 | 75 | 82 | 108.00 |
| 3/17/93 | SB68 | MSD | | 1 | 75 | 76 | 100.00 |
| 3/18/93 | SB69 | MS | 0 | 1 | 75 | 91.2 | 120.27 |
| 3/18/93 | SB69 | MSD | | 1 | 75 | 78.1 | 102.80 |
| 3/19/93 | SB70 | MS | 40 | 1 | 75 | 78 | 102.67 |
| 3/19/93 | SB70 | MSD | | 1 | 75 | 92 | 121.33 |
| 3/20/93 | SB71 | MS | 55 | 1 | 75 | 40 | 52.00 |
| 3/20/93 | SB71 | MSD | | 1 | 75 | 59 | 77.33 |
| 3/21/93 | SB72 | MS | 45 | 1 | 75 | 76 | 100.00 |
| 3/21/93 | SB72 | MSD | | 1 | 75 | 64 | 84.00 |
| 3/21/93 | SB72 | MS | 75 | 1 | 75 | 51 | 66.67 |
| 3/21/93 | SB72 | MSD | | 1 | 75 | 60 | 78.67 |

| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR ETHYLBENZENE IN SOILS (Concentrations in micrograms per kilogram) %R = Percent recovery | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| 7/29/92 | MW04-1S | MS | 15 | 1 | 75 | 6.1 | 6.80 |
| 7/29/92 | MW04-1S | MSD | | 1 | 75 | 5.9 | 6.53 |
| 9/12/92 | MW13-2B | MS | 135 | 1 | 75 | 36.4 | 47.20 |
| 9/12/92 | MW13-2B | MSD | | 1 | 75 | 39.2 | 50.93 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 1 | 75 | 40 | 52.00 |
| 9/13/92 | MW13-2B | MSD | | 1 | 75 | 42 | 54.67 |
| 9/14/92 | MW16-1D | MS | 5 | 1 | 75 | 40 | 52.00 |
| 9/14/92 | MW16-1D | MSD | | 1 | 75 | 43 | 56.00 |
| 9/28/92 | MW17-2D | MS | 30 | 1 | 75 | 200 | 265.33 |
| 9/28/92 | MW17-2D | MSD | | 1 | 75 | 220 | 292.00 |
| 9/30/92 | MW17-2D | MS | 97-98 | 1 | 75 | 130 | 172.00 |
| 9/30/92 | MW17-2D | MSD | | 1 | 75 | 160 | 212.00 |
| 10/26/92 | MW19-1D | MS | 20 | 1 | 75 | 137 | 181.33 |
| 10/26/92 | MW19-1D | MSD | | 1 | 75 | 105 | 138.67 |
| 9/23/92 | MW21-1D | MS | 5 | 55 | 75 | 172 | 156.00 |
| 9/23/92 | MW21-1D | MSD | | 55 | 75 | 181 | 168.00 |
| 9/25/92 | MW24-1D | MS | 25 | 1 | 75 | 130 | 172.00 |
| 9/25/92 | MW24-1D | MSD | | 1 | 75 | 180 | 238.67 |
| 9/1/92 | MW25-2I | MS | 35-37 | 2.1 | 75 | 221 | 291.87 |
| 9/1/92 | MW25-2I | MSD | | 2.1 | 75 | 195 | 257.20 |
| 9/11/92 | MW26-2I | MS | 39 | 1 | 75 | 42 | 54.67 |
| 9/11/92 | MW26-2I | MSD | | 1 | 75 | 33 | 42.67 |
| 9/24/92 | MW27-1B | MS | 129-130 | 1 | 75 | 100 | 132.00 |
| 9/24/92 | MW27-1B | MSD | | 1 | 75 | 160 | 212.00 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 1 | 75 | 29.3 | 37.73 |
| 9/15/92 | MW28-1B | MSD | | 1 | 75 | 31.6 | 40.80 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 1 | 75 | 14.5 | 18.00 |
| 9/15/92 | MW28-1B | MSD | | 1 | 75 | 19 | 24.00 |
| 10/27/92 | MW33-1D | MS | 0 | 1 | 75 | 175 | 232.00 |
| 10/27/92 | MW33-1D | MSD | | 1 | 75 | 171 | 226.67 |
| 11/2/92 | MW34-1D | MS | 5 | 1 | 75 | 144 | 190.67 |
| 11/2/92 | MW34-1D | MSD | | 1 | 75 | 116 | 153.33 |
| 11/4/92 | MW35-1D | MS | 5 | 1 | 75 | 213 | 282.67 |
| 11/4/92 | MW35-1D | MSD | | 1 | 75 | 299 | 397.33 |
| 12/15/92 | MW36-1D | MS | 5 | 5.8 | 75 | 249 | 324.27 |
| 12/15/92 | MW36-1D | MSD | | 5.8 | 75 | 226 | 293.60 |
| 12/17/92 | MW36-2I | MS | 53 | 1 | 75 | 186 | 246.67 |
| 12/17/92 | MW36-2I | MSD | | 1 | 75 | 168 | 222.67 |
| 1/7/93 | MW39-1D | MS | 125 | 1 | 75 | 51 | 66.67 |
| 1/7/93 | MW39-1D | MSD | | 1 | 75 | 65 | 85.33 |
| 8/27/92 | PZ32 | MS | 0 | 1 | 75 | 5.9 | 6.53 |
| 8/27/92 | PZ32 | MSD | | 1 | 75 | 8.7 | 10.27 |
| 7/18/92 | SB03 | MS | 15 | 1 | 75 | 1.6 | 0.80 |
| 7/18/92 | SB03 | MSD | | 1 | 75 | 3.9 | 3.87 |
| 7/21/92 | SB12 | MS | 15 | 1 | 75 | 4.8 | 5.07 |
| 7/21/92 | SB12 | MSD | | 1 | 75 | 2.6 | 2.13 |
| 11/19/92 | SB28 | MS | 51 | 1 | 75 | 91 | 120.00 |
| 11/19/92 | SB28 | MSD | | 1 | 75 | 95 | 125.33 |
| 11/8/92 | SB32 | MS | 46 | 1 | 75 | 1 | 0.00 |
| 11/8/92 | SB32 | MSD | | 1 | 75 | 117 | 154.67 |
| 11/8/92 | SB33 | MS | 15 | 1 | 75 | 114 | 150.67 |
| 11/8/92 | SB33 | MSD | | 1 | 75 | 102 | 134.67 |
| 11/8/92 | SB33 | MS | 48 | 1 | 75 | 139 | 184.00 |
| 11/8/92 | SB33 | MSD | | 1 | 75 | 122 | 161.33 |
| 11/7/92 | SB34 | MS | 45 | 1 | 75 | 99 | 130.67 |
| 11/7/92 | SB34 | MSD | | 1 | 75 | 113 | 149.33 |
| 10/21/92 | SB36 | MS | 5 | 1 | 75 | 149 | 197.33 |
| 10/21/92 | SB36 | MSD | | 1 | 75 | 137 | 181.33 |
| 10/21/92 | SB37 | MS | 5 | 1 | 75 | 154 | 204.00 |
| 10/21/92 | SB37 | MSD | | 1 | 75 | 136 | 180.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 1 | 75 | 185 | 245.33 |
| 10/25/92 | SB38 | MSD | | 1 | 75 | 174 | 230.67 |
| 10/25/92 | SB38 | MS | 55 | 1 | 75 | 108 | 142.67 |
| 10/25/92 | SB38 | MSD | | 1 | 75 | 126 | 166.67 |
| 10/23/92 | SB39 | MS | 0 | 1 | 75 | 185 | 245.33 |
| 10/23/92 | SB39 | MSD | | 1 | 75 | 185 | 245.33 |
| 10/22/92 | SB40 | MS | 65 | 1 | 75 | 152 | 201.33 |
| 10/22/92 | SB40 | MSD | | 1 | 75 | 133 | 176.00 |
| 10/24/92 | SB41 | MS | 0 | 1 | 75 | 174 | 230.67 |
| 10/24/92 | SB41 | MSD | | 1 | 75 | 191 | 253.33 |
| 10/23/92 | SB42 | MS | 55 | 1 | 75 | 158 | 209.33 |
| 10/23/92 | SB42 | MSD | | 1 | 75 | 213 | 282.67 |
| 10/24/92 | SB43 | MS | 0 | 1 | 75 | 224 | 297.33 |
| 10/24/92 | SB43 | MSD | | 1 | 75 | 210 | 278.67 |
| 11/9/92 | SB45 | MS | 55 | 1 | 75 | 92 | 121.33 |
| 11/9/92 | SB45 | MSD | | 1 | 75 | 67 | 88.00 |
| 11/10/92 | SB47 | MS | 10 | 1 | 75 | 256 | 340.00 |
| 11/10/92 | SB47 | MSD | | 1 | 75 | 231 | 306.67 |
| 11/11/92 | SB48 | MS | 53 | 1 | 75 | 98 | 129.33 |
| 11/11/92 | SB48 | MSD | | 1 | 75 | 87 | 114.67 |
| 11/17/92 | SB50 | MS | 30 | 1 | 75 | 221 | 293.33 |
| 11/17/92 | SB50 | MSD | | 1 | 75 | 154 | 204.00 |
| 11/20/92 | SB53 | MS | 80 | 1 | 75 | 117 | 154.67 |
| 11/20/92 | SB53 | MSD | | 1 | 75 | 128 | 169.33 |
| 11/21/92 | SB54 | MS | 80 | 1 | 75 | 115 | 152.00 |
| 11/21/92 | SB54 | MSD | | 1 | 75 | 83 | 109.33 |
| 11/21/92 | SB54 | MS | 85 | 1 | 75 | 99 | 130.67 |
| 11/21/92 | SB54 | MSD | | 1 | 75 | 131 | 173.33 |
| 11/23/92 | SB56 | MS | 55 | 1 | 75 | 164 | 217.33 |
| 11/23/92 | SB56 | MSD | | 1 | 75 | 181 | 240.00 |
| 11/23/92 | SB56 | MS | 85 | 1 | 75 | 154 | 204.00 |
| 11/23/92 | SB56 | MSD | | 1 | 75 | 132 | 174.67 |
| 11/24/92 | SB57 | MS | 50 | 1 | 75 | 194 | 257.33 |
| 11/24/92 | SB57 | MSD | | 1 | 75 | 175 | 232.00 |
| 11/30/92 | SB58 | MS | 80 | 1 | 75 | 216 | 286.67 |
| 11/30/92 | SB58 | MSD | | 1 | 75 | 220 | 292.00 |
| 12/1/92 | SB59 | MS | 95 | 1 | 75 | 297 | 394.67 |
| 12/1/92 | SB59 | MSD | | 1 | 75 | 282 | 374.67 |
| 12/2/92 | SB60 | MS | 70 | 1 | 75 | 172 | 228.00 |
| 12/2/92 | SB60 | MSD | | 1 | 75 | 178 | 236.00 |
| 12/3/92 | SB61 | MS | 80 | 1 | 75 | 205 | 272.00 |
| 12/3/92 | SB61 | MSD | | 1 | 75 | 212 | 281.33 |
| 12/4/92 | SB62 | MS | 60 | 1 | 75 | 203 | 269.33 |
| 12/4/92 | SB62 | MSD | | 1 | 75 | 241 | 320.00 |
| 12/5/92 | SB63 | MS | 80 | 1 | 75 | 172 | 228.00 |
| 12/5/92 | SB63 | MSD | | 1 | 75 | 166 | 220.00 |
| 12/9/92 | SB65 | MS | 85 | 1 | 75 | 176 | 233.33 |
| 12/9/92 | SB65 | MSD | | 1 | 75 | 178 | 236.00 |
| 12/21/92 | SB66 | MS | 15 | 1.5 | 75 | 149 | 196.67 |
| 12/21/92 | SB66 | MSD | | 1.5 | 75 | 1.9 | 0.53 |
| 3/16/93 | SB67 | MS | 11 | 1 | 75 | 115 | 152.00 |
| 3/16/93 | SB67 | MSD | | 1 | 75 | 120 | 158.67 |
| 3/17/93 | SB68 | MS | 55 | 1 | 75 | 99 | 130.67 |
| 3/17/93 | SB68 | MSD | | 1 | 75 | 92 | 121.33 |
| 3/18/93 | SB69 | MS | 0 | 1 | 75 | 88.9 | 117.20 |
| 3/18/93 | SB69 | MSD | | 1 | 75 | 78.6 | 103.47 |
| 3/19/93 | SB70 | MS | 40 | 1 | 75 | 83 | 109.33 |
| 3/19/93 | SB70 | MSD | | 1 | 75 | 90 | 118.67 |
| 3/20/93 | SB71 | MS | 55 | 1 | 75 | 35 | 45.33 |
| 3/20/93 | SB71 | MSD | | 1 | 75 | 52 | 68.00 |
| 3/21/93 | SB72 | MS | 45 | 1 | 75 | 77 | 101.33 |
| 3/21/93 | SB72 | MSD | | 1 | 75 | 66 | 86.67 |
| 3/21/93 | SB72 | MS | 75 | 1 | 75 | 52 | 68.00 |
| 3/21/93 | SB72 | MSD | | 1 | 75 | 61 | 80.00 |

| Date | Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
|---|---|---|---|---|---|---|---|
| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR XYLENE IN SOILS (Concentrations in micrograms per kilogram) | | | | | | |
| | %R = Percent recovery | | | | | | |
| 7/29/92 | MW04-1S | MS | 15 | 1 | 75 | 4.8 | 5.07 |
| 7/29/92 | MW04-1S | MSD | | 1 | 75 | 5.3 | 5.73 |
| 9/12/92 | MW13-2B | MS | 135 | 1 | 75 | 78.6 | 103.47 |
| 9/12/92 | MW13-2B | MSD | | 1 | 75 | 78.6 | 103.47 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 1 | 75 | 79 | 104.00 |
| 9/13/92 | MW13-2B | MSD | | 1 | 75 | 87 | 114.67 |
| 9/14/92 | MW16-1D | MS | 5 | 2 | 75 | 76 | 98.67 |
| 9/14/92 | MW16-1D | MSD | | 2 | 75 | 84 | 109.33 |
| 9/28/92 | MW17-2D | MS | 30 | 1 | 75 | 410 | 545.33 |
| 9/28/92 | MW17-2D | MSD | | 1 | 75 | 480 | 638.67 |
| 9/30/92 | MW17-2D | MS | 97-98 | 1 | 75 | 240 | 318.67 |
| 9/30/92 | MW17-2D | MSD | | 1 | 75 | 320 | 425.33 |
| 10/26/92 | MW19-1D | MS | 20 | 1 | 75 | 132 | 174.67 |
| 10/26/92 | MW19-1D | MSD | | 1 | 75 | 107 | 141.33 |
| 9/23/92 | MW21-1D | MS | 5 | 65 | 75 | 382 | 422.67 |
| 9/23/92 | MW21-1D | MSD | | 65 | 75 | 380 | 420.00 |
| 9/25/92 | MW24-1D | MS | 25 | 1 | 75 | 260 | 345.33 |
| 9/25/92 | MW24-1D | MSD | | 1 | 75 | 340 | 452.00 |
| 9/1/92 | MW25-2I | MS | 35-37 | 1 | 75 | 329 | 437.33 |
| 9/1/92 | MW25-2I | MSD | | 1 | 75 | 315 | 418.67 |
| 9/11/92 | MW26-2I | MS | 39 | 1 | 75 | 92 | 121.33 |
| 9/11/92 | MW26-2I | MSD | | 1 | 75 | 65 | 85.33 |
| 9/24/92 | MW27-1B | MS | 129-130 | 1 | 75 | 210 | 278.67 |
| 9/24/92 | MW27-1B | MSD | | 1 | 75 | 330 | 438.67 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 1 | 75 | 56.4 | 73.87 |
| 9/15/92 | MW28-1B | MSD | | 1 | 75 | 59.7 | 78.27 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 1 | 75 | 25.7 | 32.93 |
| 9/15/92 | MW28-1B | MSD | | 1 | 75 | 32.5 | 42.00 |
| 10/27/92 | MW33-1D | MS | 0 | 1 | 75 | 167 | 221.33 |
| 10/27/92 | MW33-1D | MSD | | 1 | 75 | 159 | 210.67 |
| 11/2/92 | MW34-1D | MS | 5 | 1 | 75 | 130 | 172.00 |
| 11/2/92 | MW34-1D | MSD | | 1 | 75 | 94 | 124.00 |
| 11/4/92 | MW35-1D | MS | 5 | 1 | 75 | 202 | 268.00 |
| 11/4/92 | MW35-1D | MSD | | 1 | 75 | 291 | 386.67 |
| 12/15/92 | MW36-1D | MS | 5 | 9.6 | 75 | 250 | 320.53 |
| 12/15/92 | MW36-1D | MSD | | 9.6 | 75 | 224 | 285.87 |
| 12/17/92 | MW36-2I | MS | 53 | 1 | 75 | 196 | 260.00 |
| 12/17/92 | MW36-2I | MSD | | 1 | 75 | 163 | 216.00 |
| 1/7/93 | MW39-1D | MS | 125 | 1 | 75 | 50 | 65.33 |
| 1/7/93 | MW39-1D | MSD | | 1 | 75 | 68 | 89.33 |
| 8/27/92 | PZ32 | MS | 0 | 1 | 75 | 3.8 | 3.73 |
| 8/27/92 | PZ32 | MSD | | 1 | 75 | 5.7 | 6.27 |
| 7/18/92 | SB03 | MS | 15 | 1.2 | 75 | 2.4 | 1.60 |
| 7/18/92 | SB03 | MSD | | 1.2 | 75 | 3.4 | 2.93 |
| 7/21/92 | SB12 | MS | 15 | 1 | 75 | 3.8 | 3.73 |
| 7/21/92 | SB12 | MSD | | 1 | 75 | 2.9 | 2.53 |
| 11/19/92 | SB28 | MS | 51 | 1 | 75 | 88 | 116.00 |
| 11/19/92 | SB28 | MSD | | 1 | 75 | 95 | 125.33 |
| 11/8/92 | SB32 | MS | 46 | 1 | 75 | 1 | 0.00 |
| 11/8/92 | SB32 | MSD | | 1 | 75 | 110 | 145.33 |
| 11/8/92 | SB33 | MS | 15 | 2.4 | 75 | 117 | 152.80 |
| 11/8/92 | SB33 | MSD | | 2.4 | 75 | 100 | 130.13 |
| 11/8/92 | SB33 | MS | 48 | 1 | 75 | 128 | 169.33 |
| 11/8/92 | SB33 | MSD | | 1 | 75 | 119 | 157.33 |
| 11/7/92 | SB34 | MS | 45 | 1 | [illegible] | 96 | 126.67 |
| 11/7/92 | SB34 | MSD | | 1 | 75 | 103 | 136.00 |
| 10/21/92 | SB36 | MS | 5 | 1 | 75 | 154 | 204.00 |
| 10/21/92 | SB36 | MSD | | 1 | 75 | 133 | 176.00 |
| 10/21/92 | SB37 | MS | 5 | 1 | 75 | 138 | 182.67 |
| 10/21/92 | SB37 | MSD | | 1 | 75 | 123 | 162.67 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 1 | 75 | 175 | 232.00 |
| 10/25/92 | SB38 | MSD | | 1 | 75 | 165 | 218.67 |
| 10/25/92 | SB38 | MS | 55 | 1 | 75 | 107 | 141.33 |
| 10/25/92 | SB38 | MSD | | 1 | 75 | 129 | 170.67 |
| 10/23/92 | SB39 | MS | 0 | 1 | 75 | 179 | 237.33 |
| 10/23/92 | SB39 | MSD | | 1 | 75 | 179 | 237.33 |
| 10/22/92 | SB40 | MS | 65 | 1 | 75 | 141 | 186.67 |
| 10/22/92 | SB40 | MSD | | 1 | 75 | 139 | 184.00 |
| 10/24/92 | SB41 | MS | 0 | 1 | 75 | 170 | 225.33 |
| 10/24/92 | SB41 | MSD | | 1 | 75 | 177 | 234.67 |
| 10/23/92 | SB42 | MS | 55 | 1 | 75 | 157 | 208.00 |
| 10/23/92 | SB42 | MSD | | 1 | 75 | 210 | 278.67 |
| 10/24/92 | SB43 | MS | 0 | 1 | 75 | 221 | 293.33 |
| 10/24/92 | SB43 | MSD | | 1 | 75 | 194 | 257.33 |
| 11/9/92 | SB45 | MS | 55 | 1 | 75 | 92 | 121.33 |
| 11/9/92 | SB45 | MSD | | 1 | 75 | 60 | 78.67 |
| 11/10/92 | SB47 | MS | 10 | 1 | 75 | 254 | 337.33 |
| 11/10/92 | SB47 | MSD | | 1 | 75 | 221 | 293.33 |
| 11/11/92 | SB48 | MS | 53 | 1 | 75 | 108 | 142.67 |
| 11/11/92 | SB48 | MSD | | 1 | 75 | 76 | 100.00 |
| 11/17/92 | SB50 | MS | 30 | 1 | 75 | 210 | 278.67 |
| 11/17/92 | SB50 | MSD | | 1 | 75 | 149 | 197.33 |
| 11/20/92 | SB53 | MS | 80 | 1 | 75 | 124 | 164.00 |
| 11/20/92 | SB53 | MSD | | 1 | 75 | 111 | 146.67 |
| 11/21/92 | SB54 | MS | 80 | 1 | 75 | 103 | 136.00 |
| 11/21/92 | SB54 | MSD | | 1 | 75 | 83 | 109.33 |
| 11/21/92 | SB54 | MS | 85 | 1 | 75 | 81 | 106.67 |
| 11/21/92 | SB54 | MSD | | 1 | 75 | 124 | 164.00 |
| 11/23/92 | SB56 | MS | 55 | 1 | 75 | 162 | 214.67 |
| 11/23/92 | SB56 | MSD | | 1 | 75 | 193 | 256.00 |
| 11/23/92 | SB56 | MS | 85 | 1 | 75 | 152 | 201.33 |
| 11/23/92 | SB56 | MSD | | 1 | 75 | 140 | 185.33 |
| 11/24/92 | SB57 | MS | 50 | 1 | 75 | 182 | 241.33 |
| 11/24/92 | SB57 | MSD | | 1 | 75 | 176 | 233.33 |
| 11/30/92 | SB58 | MS | 80 | 1 | 75 | 211 | 280.00 |
| 11/30/92 | SB58 | MSD | | 1 | 75 | 226 | 300.00 |
| 12/1/92 | SB59 | MS | 95 | 1 | 75 | 278 | 369.33 |
| 12/1/92 | SB59 | MSD | | 1 | 75 | 292 | 388.00 |
| 12/2/92 | SB60 | MS | 70 | 1 | 75 | 166 | 220.00 |
| 12/2/92 | SB60 | MSD | | 1 | 75 | 180 | 238.67 |
| 12/3/92 | SB61 | MS | 80 | 1 | 75 | 186 | 246.67 |
| 12/3/92 | SB61 | MSD | | 1 | 75 | 205 | 272.00 |
| 12/4/92 | SB62 | MS | 60 | 1 | 75 | 198 | 262.67 |
| 12/4/92 | SB62 | MSD | | 1 | 75 | 218 | 289.33 |
| 12/5/92 | SB63 | MS | 80 | 1 | 75 | 166 | 220.00 |
| 12/5/92 | SB63 | MSD | | 1 | 75 | 156 | 206.67 |
| 12/9/92 | SB65 | MS | 85 | 1 | 75 | 122 | 161.33 |
| 12/9/92 | SB65 | MSD | | 1 | 75 | 179 | 237.33 |
| 12/21/92 | SB66 | MS | 15 | 1.5 | 75 | 106 | 139.33 |
| 12/21/92 | SB66 | MSD | | 1.5 | 75 | 124 | 163.33 |
| 3/16/93 | SB67 | MS | 11 | 1 | 75 | 80 | 105.33 |
| 3/16/93 | SB67 | MSD | | 1 | 75 | 96 | 126.67 |
| 3/17/93 | SB68 | MS | 55 | 1 | 75 | 79 | 104.00 |
| 3/17/93 | SB68 | MSD | | 1 | 75 | 72 | 94.67 |
| 3/18/93 | SB69 | MS | 0 | 1 | 75 | 97.2 | 128.27 |
| 3/18/93 | SB69 | MSD | | 1 | 75 | 75.9 | 99.87 |
| 3/19/93 | SB70 | MS | 40 | 1 | 75 | 85 | 112.00 |
| 3/19/93 | SB70 | MSD | | 1 | 75 | 93 | 122.67 |
| 3/20/93 | SB71 | MS | 55 | 1 | 75 | 35 | 45.33 |
| 3/20/93 | SB71 | MSD | | 1 | 75 | 52 | 68.00 |
| 3/21/93 | SB72 | MS | 45 | 1 | 75 | 82 | 108.00 |
| 3/21/93 | SB72 | MSD | | 1 | 75 | 66 | 86.67 |
| 3/21/93 | SB72 | MS | 75 | 1 | 75 | 45.5 | 59.33 |
| 3/21/93 | SB72 | MSD | | 1 | 75 | 58.2 | 76.27 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR CHLOROFORM IN SOILS | | | | | | |
| | (Concentrations in micrograms per kilogram) | | | | | | |
| | %R = Percent recovery | | | | | | |
| | | | | Unspiked | | Spiked | |
| Date | Sample # | MS/MSD | Depth | Meas Conc. | Spike Conc. | Meas Conc. | %R |
| 7/29/92 | MW04-1S | MS | 15 | 0.5 | 15 | 0.79 | 1.93 |
| 7/29/92 | MW04-1S | MSD | | 0.5 | 15 | 0.78 | 1.87 |
| 9/12/92 | MW13-2B | MS | 135 | 0.5 | 15 | 9.13 | 57.53 |
| 9/12/92 | MW13-2B | MSD | | 0.5 | 15 | 9.06 | 57.07 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 0.5 | 15 | 9.43 | 59.53 |
| 9/13/92 | MW13-2B | MSD | | 0.5 | 15 | 8.66 | 54.40 |
| 9/14/92 | MW16-1D | MS | 5 | 0.5 | 15 | 10.2 | 64.67 |
| 9/14/92 | MW16-1D | MSD | | 0.5 | 15 | 9.6 | 60.67 |
| 9/28/92 | MW17-2D | MS | 30 | 0.5 | 15 | 49 | 323.33 |
| 9/28/92 | MW17-2D | MSD | | 0.5 | 15 | 51 | 336.67 |
| 9/30/92 | MW17-2D | MS | 97-98 | 0.5 | 15 | 38 | 250.00 |
| 9/30/92 | MW17-2D | MSD | | 0.5 | 15 | 34 | 223.33 |
| 10/26/92 | MW19-1D | MS | 20 | 0.5 | 15 | 33.9 | 222.67 |
| 10/26/92 | MW19-1D | MSD | | 0.5 | 15 | 29.2 | 191.33 |
| 9/23/92 | MW21-1D | MS | 5 | 0.5 | 15 | 21 | 136.67 |
| 9/23/92 | MW21-1D | MSD | | 0.5 | 15 | 23 | 150.00 |
| 9/25/92 | MW24-1D | MS | 25 | 0.5 | 15 | 39 | 256.67 |
| 9/25/92 | MW24-1D | MSD | | 0.5 | 15 | 33 | 216.67 |
| 9/1/92 | MW25-2I | MS | 35-37 | 0.5 | 15 | 34 | 223.33 |
| 9/1/92 | MW25-2I | MSD | | 0.5 | 15 | 38 | 250.00 |
| 9/11/92 | MW26-2I | MS | 39 | 0.5 | 15 | 6.8 | 42.00 |
| 9/11/92 | MW26-2I | MSD | | 0.5 | 15 | 7.4 | 46.00 |
| 9/24/92 | MW27-1B | MS | 129-130 | 0.5 | 15 | 30 | 196.67 |
| 9/24/92 | MW27-1B | MSD | | 0.5 | 15 | 32 | 210.00 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 0.5 | 15 | 10.9 | 69.33 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 15 | 9.4 | 59.33 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 0.5 | 15 | 7.7 | 48.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 15 | 7.7 | 48.00 |
| 10/27/92 | MW33-1D | MS | 0 | 0.5 | 15 | 29.4 | 192.67 |
| 10/27/92 | MW33-1D | MSD | | 0.5 | 15 | 29.8 | 195.33 |
| 11/2/92 | MW34-1D | MS | 5 | 0.5 | 15 | 32.9 | 216.00 |
| 11/2/92 | MW34-1D | MSD | | 0.5 | 15 | 39.2 | 258.00 |
| 11/4/92 | MW35-1D | MS | 5 | 0.5 | 15 | 48 | 316.67 |
| 11/4/92 | MW35-1D | MSD | | 0.5 | 15 | 50 | 330.00 |
| 12/15/92 | MW36-1D | MS | 5 | 0.5 | 15 | 42.6 | 280.67 |
| 12/15/92 | MW36-1D | MSD | | 0.5 | 15 | 41.9 | 276.00 |
| 12/17/92 | MW36-2I | MS | 53 | 0.5 | 15 | 36.1 | 237.33 |
| 12/17/92 | MW36-2I | MSD | | 0.5 | 15 | 36.1 | 237.33 |
| 1/7/93 | MW39-1D | MS | 125 | 0.5 | 15 | 20.2 | 131.33 |
| 1/7/93 | MW39-1D | MSD | | 0.5 | 15 | 20.6 | 134.00 |
| 8/27/92 | PZ32 | MS | 0 | 0.5 | 15 | 1.1 | 4.00 |
| 8/27/92 | PZ32 | MSD | | 0.5 | 15 | 1.1 | 4.00 |
| 7/18/92 | SB03 | MS | 15 | 0.5 | 15 | 0.5 | 0.00 |
| 7/18/92 | SB03 | MSD | | 0.5 | 15 | 0.5 | 0.00 |
| 7/21/92 | SB12 | MS | 15 | 0.5 | 15 | 0.66 | 1.07 |
| 7/21/92 | SB12 | MSD | | 0.41 | 15 | 0.41 | 0.00 |
| 11/19/92 | SB28 | MS | 51 | 0.5 | 15 | 29.5 | 193.33 |
| 11/19/92 | SB28 | MSD | | 0.5 | 15 | 29.9 | 196.00 |
| 11/8/92 | SB32 | MS | 46 | 0.5 | 15 | 0.5 | 0.00 |
| 11/8/92 | SB32 | MSD | | 0.5 | 15 | 26 | 170.00 |
| 11/8/92 | SB33 | MS | 15 | 0.5 | 15 | 29.7 | 194.67 |
| 11/8/92 | SB33 | MSD | | 0.5 | 15 | 30.8 | 202.00 |
| 11/8/92 | SB33 | MS | 48 | 0.5 | 15 | 38.2 | 251.33 |
| 11/8/92 | SB33 | MSD | | 0.5 | 15 | 35.1 | 230.67 |
| 11/7/92 | SB34 | MS | 45 | 0.5 | 15 | 45 | 296.67 |
| 11/7/92 | SB34 | MSD | | 0.5 | 15 | 42 | 276.67 |
| 10/21/92 | SB36 | MS | 5 | 0.5 | 15 | 33 | 216.67 |
| 10/21/92 | SB36 | MSD | | 0.5 | 15 | 30.1 | 197.33 |
| 10/21/92 | SB37 | MS | 5 | 0.5 | 15 | 38.7 | 254.67 |
| 10/21/92 | SB37 | MSD | | 0.5 | 15 | 31 | 203.33 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 0.5 | 15 | 39.1 | 257.33 |
| 10/25/92 | SB38 | MSD | | 0.5 | 15 | 38.3 | 252.00 |
| 10/25/92 | SB38 | MS | 55 | 0.5 | 15 | 31.8 | 208.67 |
| 10/25/92 | SB38 | MSD | | 0.5 | 15 | 31.4 | 206.00 |
| 10/23/92 | SB39 | MS | 0 | 0.5 | 15 | 38.8 | 255.33 |
| 10/23/92 | SB39 | MSD | | 0.5 | 15 | 33.7 | 221.33 |
| 10/22/92 | SB40 | MS | 65 | 0.5 | 15 | 35 | 230.00 |
| 10/22/92 | SB40 | MSD | | 0.5 | 15 | 30.2 | 198.00 |
| 10/24/92 | SB41 | MS | 0 | 0.5 | 15 | 44.3 | 292.00 |
| 10/24/92 | SB41 | MSD | | 0.5 | 15 | 42.8 | 282.00 |
| 10/23/92 | SB42 | MS | 55 | 0.5 | 15 | 28.9 | 189.33 |
| 10/23/92 | SB42 | MSD | | 0.5 | 15 | 34.1 | 224.00 |
| 10/24/92 | SB43 | MS | 0 | 0.5 | 15 | 49 | 323.33 |
| 10/24/92 | SB43 | MSD | | 0.5 | 15 | 45.6 | 300.67 |
| 11/9/92 | SB45 | MS | 55 | 0.5 | 15 | 35.1 | 230.67 |
| 11/9/92 | SB45 | MSD | | 0.5 | 15 | 27.8 | 182.00 |
| 11/10/92 | SB47 | MS | 10 | 0.5 | 15 | 48 | 316.67 |
| 11/10/92 | SB47 | MSD | | 0.5 | 15 | 48 | 316.67 |
| 11/11/92 | SB48 | MS | 53 | 0.5 | 15 | 35 | 230.00 |
| 11/11/92 | SB48 | MSD | | 0.5 | 15 | 41 | 270.00 |
| 11/17/92 | SB50 | MS | 30 | 0.5 | 15 | 40.2 | 264.67 |
| 11/17/92 | SB50 | MSD | | 0.5 | 15 | 41.9 | 276.00 |
| 11/20/92 | SB53 | MS | 80 | 0.5 | 15 | 38.1 | 250.67 |
| 11/20/92 | SB53 | MSD | | 0.5 | 15 | 34.4 | 226.00 |
| 11/21/92 | SB54 | MS | 80 | 0.5 | 15 | 34.1 | 224.00 |
| 11/21/92 | SB54 | MSD | | 0.5 | 15 | 33.6 | 220.67 |
| 11/21/92 | SB54 | MS | 85 | 0.5 | 15 | 28.6 | 187.33 |
| 11/21/92 | SB54 | MSD | | 0.5 | 15 | 30.6 | 200.67 |
| 11/23/92 | SB56 | MS | 55 | 0.5 | 15 | 27.9 | 182.67 |
| 11/23/92 | SB56 | MSD | | 0.5 | 15 | 31.1 | 204.00 |
| 11/23/92 | SB56 | MS | 85 | 0.5 | 15 | 26.4 | 172.67 |
| 11/23/92 | SB56 | MSD | | 0.5 | 15 | 25.1 | 164.00 |
| 11/24/92 | SB57 | MS | 50 | 0.5 | 15 | 32.1 | 210.67 |
| 11/24/92 | SB57 | MSD | | 0.5 | 15 | 30.4 | 199.33 |
| 11/30/92 | SB58 | MS | 80 | 0.5 | 15 | 38.6 | 254.00 |
| 11/30/92 | SB58 | MSD | | 0.5 | 15 | 37.6 | 247.33 |
| 12/1/92 | SB59 | MS | 95 | 0.5 | 15 | 52.1 | 344.00 |
| 12/1/92 | SB59 | MSD | | 0.5 | 15 | 51.5 | 340.00 |
| 12/2/92 | SB60 | MS | 70 | 0.5 | 15 | 37.1 | 244.00 |
| 12/2/92 | SB60 | MSD | | 0.5 | 15 | 37.8 | 248.67 |
| 12/3/92 | SB61 | MS | 80 | 0.5 | 15 | 36.4 | 239.33 |
| 12/3/92 | SB61 | MSD | | 0.5 | 15 | 33.6 | 220.67 |
| 12/4/92 | SB62 | MS | 60 | 0.5 | 15 | 32.7 | 214.67 |
| 12/4/92 | SB62 | MSD | | 0.5 | 15 | 33.4 | 219.33 |
| 12/5/92 | SB63 | MS | 80 | 0.5 | 15 | 35 | 230.00 |
| 12/5/92 | SB63 | MSD | | 0.5 | 15 | 29.9 | 196.00 |
| 12/9/92 | SB65 | MS | 85 | 0.5 | 15 | 36.9 | 242.67 |
| 12/9/92 | SB65 | MSD | | 0.5 | 15 | 37.7 | 248.00 |
| 12/21/92 | SB66 | MS | 15 | 0.5 | 15 | 25.3 | 165.33 |
| 12/21/92 | SB66 | MSD | | 0.5 | 15 | 24.9 | 162.67 |
| 3/16/93 | SB67 | MS | 11 | 0.5 | 15 | 20 | 130.00 |
| 3/16/93 | SB67 | MSD | | 0.5 | 15 | 21 | 136.67 |
| 3/17/93 | SB68 | MS | 55 | 0.5 | 15 | 19 | 123.33 |
| 3/17/93 | SB68 | MSD | | 0.5 | 15 | 18 | 116.67 |
| 3/18/93 | SB69 | MS | 0 | 0.5 | 15 | 21.8 | 142.00 |
| 3/18/93 | SB69 | MSD | | 0.5 | 15 | 19.6 | 127.33 |
| 3/19/93 | SB70 | MS | 40 | 0.5 | 15 | 16.1 | 104.00 |
| 3/19/93 | SB70 | MSD | | 0.5 | 15 | 16.9 | 109.33 |
| 3/20/93 | SB71 | MS | 55 | 0.5 | 15 | 11.6 | 74.00 |
| 3/20/93 | SB71 | MSD | | 0.5 | 15 | 13.6 | 87.33 |
| 3/21/93 | SB72 | MS | 45 | 0.5 | 15 | 14.7 | 94.67 |
| 3/21/93 | SB72 | MSD | | 0.5 | 15 | 12.4 | 79.33 |
| 3/21/93 | SB72 | MS | 75 | 0.5 | 15 | 13.3 | 85.33 |
| 3/21/93 | SB72 | MSD | | 0.5 | 15 | 14.5 | 93.33 |

| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR 1,1,1-TCA IN SOILS (Concentrations in micrograms per kilogram) | | | | | | |
|---|---|---|---|---|---|---|---|
| | %R = Percent recovery | | | | | | |
| Date | Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| 7/29/92 | MW04-1S | MS | 15 | 0.51 | 15 | 0.83 | 2.13 |
| 7/29/92 | MW04-1S | MSD | | 0.51 | 15 | 0.68 | 1.13 |
| 9/12/92 | MW13-2B | MS | 135 | 0.5 | 15 | 7.32 | 45.47 |
| 9/12/92 | MW13-2B | MSD | | 0.5 | 15 | 7.33 | 45.53 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 0.5 | 15 | 7.29 | 45.27 |
| 9/13/92 | MW13-2B | MSD | | 0.5 | 15 | 6.71 | 41.40 |
| 9/14/92 | MW16-1D | MS | 5 | 0.5 | 15 | 8.1 | 50.67 |
| 9/14/92 | MW16-1D | MSD | | 0.5 | 15 | 7.9 | 49.33 |
| 9/28/92 | MW17-2D | MS | 30 | 0.5 | 15 | 38 | 250.00 |
| 9/28/92 | MW17-2D | MSD | | 0.5 | 15 | 41 | 270.00 |
| 9/30/92 | MW17-2D | MS | 97-98 | 0.5 | 15 | 34 | 223.33 |
| 9/30/92 | MW17-2D | MSD | | 0.5 | 15 | 32 | 210.00 |
| 10/26/92 | MW19-1D | MS | 20 | 0.5 | 15 | 29.7 | 194.67 |
| 10/26/92 | MW19-1D | MSD | | 0.5 | 15 | 25.2 | 164.67 |
| 9/23/92 | MW21-1D | MS | 5 | 0.5 | 15 | 20 | 130.00 |
| 9/23/92 | MW21-1D | MSD | | 0.5 | 15 | 22 | 143.33 |
| 9/25/92 | MW24-1D | MS | 25 | 0.5 | 15 | 32 | 210.00 |
| 9/25/92 | MW24-1D | MSD | | 0.5 | 15 | 28 | 183.33 |
| 9/1/92 | MW25-2I | MS | 35-37 | 0.5 | 15 | 31 | 203.33 |
| 9/1/92 | MW25-2I | MSD | | 0.5 | 15 | 36 | 236.67 |
| 9/11/92 | MW26-2I | MS | 39 | 0.5 | 15 | 6 | 36.67 |
| 9/11/92 | MW26-2I | MSD | | 0.5 | 15 | 6.5 | 40.00 |
| 9/24/92 | MW27-1B | MS | 129-130 | 0.5 | 15 | 25 | 163.33 |
| 9/24/92 | MW27-1B | MSD | | 0.5 | 15 | 27 | 176.67 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 0.5 | 15 | 8 | 50.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 15 | 6.9 | 42.67 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 0.5 | 15 | 5.9 | 36.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 15 | 6 | 36.67 |
| 10/27/92 | MW33-1D | MS | 0 | 0.5 | 15 | 26.5 | 173.33 |
| 10/27/92 | MW33-1D | MSD | | 0.5 | 15 | 27 | 176.67 |
| 11/2/92 | MW34-1D | MS | 5 | 0.5 | 15 | 29.3 | 192.00 |
| 11/2/92 | MW34-1D | MSD | | 0.5 | 15 | 35 | 230.00 |
| 11/4/92 | MW35-1D | MS | 5 | 0.5 | 15 | 40 | 263.33 |
| 11/4/92 | MW35-1D | MSD | | 0.5 | 15 | 42 | 276.67 |
| 12/15/92 | MW36-1D | MS | 5 | 0.5 | 15 | 39.4 | 259.33 |
| 12/15/92 | MW36-1D | MSD | | 0.5 | 15 | 39.2 | 258.00 |
| 12/17/92 | MW36-2I | MS | 53 | 0.5 | 15 | 34.9 | 229.33 |
| 12/17/92 | MW36-2I | MSD | | 0.5 | 15 | 33.9 | 222.67 |
| 1/7/93 | MW39-1D | MS | 125 | 0.5 | 15 | 20 | 130.00 |
| 1/7/93 | MW39-1D | MSD | | 0.5 | 15 | 20.6 | 134.00 |
| 8/27/92 | PZ32 | MS | 0 | 0.5 | 15 | 0.69 | 1.27 |
| 8/27/92 | PZ32 | MSD | | 0.5 | 15 | 0.66 | 1.07 |
| 7/18/92 | SB03 | MS | 15 | 0.5 | 15 | 0.5 | 0.00 |
| 7/18/92 | SB03 | MSD | | 0.5 | 15 | 0.5 | 0.00 |
| 7/21/92 | SB12 | MS | 15 | 0.5 | 15 | 0.57 | 0.47 |
| 7/21/92 | SB12 | MSD | | 0.37 | 15 | 0.37 | 0.00 |
| 11/19/92 | SB28 | MS | 51 | 0.5 | 15 | 30.3 | 198.67 |
| 11/19/92 | SB28 | MSD | | 0.5 | 15 | 30.2 | 198.00 |
| 11/8/92 | SB32 | MS | 46 | 0.5 | 15 | 0.5 | 0.00 |
| 11/8/92 | SB32 | MSD | | 0.5 | 15 | 24.5 | 160.00 |
| 11/8/92 | SB33 | MS | 15 | 0.5 | 15 | 25.7 | 168.00 |
| 11/8/92 | SB33 | MSD | | 0.5 | 15 | 27.6 | 180.67 |
| 11/8/92 | SB33 | MS | 48 | 0.5 | 15 | 33.4 | 219.33 |
| 11/8/92 | SB33 | MSD | | 0.5 | 15 | 30.6 | 200.67 |
| 11/7/92 | SB34 | MS | 45 | 0.5 | 15 | 42.3 | 278.67 |
| 11/7/92 | SB34 | MSD | | 0.5 | 15 | 41.1 | 270.67 |
| 10/21/92 | SB36 | MS | 5 | 0.5 | 15 | 30.1 | 197.33 |
| 10/21/92 | SB36 | MSD | | 0.5 | 15 | 27.6 | 180.67 |
| 10/21/92 | SB37 | MS | 5 | 0.5 | 15 | 34.5 | 226.67 |
| 10/21/92 | SB37 | MSD | | 0.5 | 15 | 28 | 183.33 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 0.5 | 15 | 33.6 | 220.67 |
| 10/25/92 | SB38 | MSD | | 0.5 | 15 | 32.5 | 213.33 |
| 10/25/92 | SB38 | MS | 55 | 0.5 | 15 | 30.9 | 202.67 |
| 10/25/92 | SB38 | MSD | | 0.5 | 15 | 30.7 | 201.33 |
| 10/23/92 | SB39 | MS | 0 | 0.5 | 15 | 35 | 230.00 |
| 10/23/92 | SB39 | MSD | | 0.5 | 15 | 30.4 | 199.33 |
| 10/22/92 | SB40 | MS | 65 | 0.5 | 15 | 33.1 | 217.33 |
| 10/22/92 | SB40 | MSD | | 0.5 | 15 | 29.2 | 191.33 |
| 10/24/92 | SB41 | MS | 0 | 0.5 | 15 | 41 | 270.00 |
| 10/24/92 | SB41 | MSD | | 0.5 | 15 | 39.8 | 262.00 |
| 10/23/92 | SB42 | MS | 55 | 0.5 | 15 | 25.1 | 164.00 |
| 10/23/92 | SB42 | MSD | | 0.5 | 15 | 29.7 | 194.67 |
| 10/24/92 | SB43 | MS | 0 | 0.5 | 15 | 45.2 | 298.00 |
| 10/24/92 | SB43 | MSD | | 0.5 | 15 | 42.3 | 278.67 |
| 11/9/92 | SB45 | MS | 55 | 0.5 | 15 | 34.9 | 229.33 |
| 11/9/92 | SB45 | MSD | | 0.5 | 15 | 28.5 | 186.67 |
| 11/10/92 | SB47 | MS | 10 | 0.5 | 15 | 42 | 276.67 |
| 11/10/92 | SB47 | MSD | | 0.5 | 15 | 43 | 283.33 |
| 11/11/92 | SB48 | MS | 53 | 0.5 | 15 | 33 | 216.67 |
| 11/11/92 | SB48 | MSD | | 0.5 | 15 | 40 | 263.33 |
| 11/17/92 | SB50 | MS | 30 | 0.5 | 15 | 34 | 223.33 |
| 11/17/92 | SB50 | MSD | | 0.5 | 15 | 39.4 | 259.33 |
| 11/20/92 | SB53 | MS | 80 | 0.5 | 15 | 34.5 | 226.67 |
| 11/20/92 | SB53 | MSD | | 0.5 | 15 | 31.3 | 205.33 |
| 11/21/92 | SB54 | MS | 80 | 0.5 | 15 | 30.9 | 202.67 |
| 11/21/92 | SB54 | MSD | | 0.5 | 15 | 32.6 | 214.00 |
| 11/21/92 | SB54 | MS | 85 | 0.5 | 15 | 27.5 | 180.00 |
| 11/21/92 | SB54 | MSD | | 0.5 | 15 | 29.7 | 194.67 |
| 11/23/92 | SB56 | MS | 55 | 0.5 | 15 | 27.7 | 181.33 |
| 11/23/92 | SB56 | MSD | | 0.5 | 15 | 31.3 | 205.33 |
| 11/23/92 | SB56 | MS | 85 | 0.5 | 15 | 26.5 | 173.33 |
| 11/23/92 | SB56 | MSD | | 0.5 | 15 | 25.4 | 166.00 |
| 11/24/92 | SB57 | MS | 50 | 0.5 | 15 | 30.6 | 200.67 |
| 11/24/92 | SB57 | MSD | | 0.5 | 15 | 30.3 | 198.67 |
| 11/30/92 | SB58 | MS | 80 | 0.5 | 15 | 34.5 | 226.67 |
| 11/30/92 | SB58 | MSD | | 0.5 | 15 | 32.5 | 213.33 |
| 12/1/92 | SB59 | MS | 95 | 0.5 | 15 | 48 | 316.67 |
| 12/1/92 | SB59 | MSD | | 0.5 | 15 | 46.3 | 305.33 |
| 12/2/92 | SB60 | MS | 70 | 0.5 | 15 | 35 | 230.00 |
| 12/2/92 | SB60 | MSD | | 0.5 | 15 | 36.1 | 237.33 |
| 12/3/92 | SB61 | MS | 80 | 0.5 | 15 | 34.5 | 226.67 |
| 12/3/92 | SB61 | MSD | | 0.5 | 15 | 31.7 | 208.00 |
| 12/4/92 | SB62 | MS | 60 | 0.5 | 15 | 32 | 210.00 |
| 12/4/92 | SB62 | MSD | | 0.5 | 15 | 32.7 | 214.67 |
| 12/5/92 | SB63 | MS | 80 | 0.5 | 15 | 33.3 | 218.67 |
| 12/5/92 | SB63 | MSD | | 0.5 | 15 | 28.7 | 188.00 |
| 12/9/92 | SB65 | MS | 85 | 0.5 | 15 | 35.6 | 234.00 |
| 12/9/92 | SB65 | MSD | | 0.5 | 15 | 36.2 | 238.00 |
| 12/21/92 | SB66 | MS | 15 | 0.5 | 15 | 21.4 | 139.33 |
| 12/21/92 | SB66 | MSD | | 0.5 | 15 | 20.4 | 132.67 |
| 3/16/93 | SB67 | MS | 11 | 0.5 | 15 | 19 | 123.33 |
| 3/16/93 | SB67 | MSD | | 0.5 | 15 | 19 | 123.33 |
| 3/17/93 | SB68 | MS | 55 | 0.5 | 15 | 17 | 110.00 |
| 3/17/93 | SB68 | MSD | | 0.5 | 15 | 17 | 110.00 |
| 3/18/93 | SB69 | MS | 0 | 0.5 | 15 | 18.9 | 122.67 |
| 3/18/93 | SB69 | MSD | | 0.5 | 15 | 17.1 | 110.67 |
| 3/19/93 | SB70 | MS | 40 | 0.5 | 15 | 14.6 | 94.00 |
| 3/19/93 | SB70 | MSD | | 0.5 | 15 | 15.2 | 98.00 |
| 3/20/93 | SB71 | MS | 55 | 0.5 | 15 | 10.5 | 66.67 |
| 3/20/93 | SB71 | MSD | | 0.5 | 15 | 12.4 | 79.33 |
| 3/21/93 | SB72 | MS | 45 | 0.5 | 15 | 14.3 | 92.00 |
| 3/21/93 | SB72 | MSD | | 0.5 | 15 | 12.2 | 78.00 |
| 3/21/93 | SB72 | MS | 75 | 0.5 | 15 | 12.6 | 80.67 |
| 3/21/93 | SB72 | MSD | | 0.5 | 15 | 13.5 | 86.67 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR CARBON TETRACHLORIDE IN SOILS | | | | | | |
| | (Concentrations in micrograms per kilogram) | | | | | | |
| | %R = Percent recovery | | | | | | |
| | | | | Unspiked | | Spiked | |
| Date | Sample # | MS/MSD | Depth | Meas Conc. | Spike Conc. | Meas Conc. | %R |
| 7/29/92 | MW04-1S | MS | 15 | 0.38 | 10 | 0.38 | 0.00 |
| 7/29/92 | MW04-1S | MSD | | 0.36 | 10 | 0.36 | 0.00 |
| 9/12/92 | MW13-2B | MS | 135 | 0.5 | 10 | 4.21 | 37.10 |
| 9/12/92 | MW13-2B | MSD | | 0.5 | 10 | 4.15 | 36.50 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 0.5 | 10 | 4.16 | 36.60 |
| 9/13/92 | MW13-2B | MSD | | 0.5 | 10 | 3.86 | 33.60 |
| 9/14/92 | MW16-1D | MS | 5 | 0.5 | 10 | 4.8 | 43.00 |
| 9/14/92 | MW16-1D | MSD | | 0.5 | 10 | 4.6 | 41.00 |
| 9/28/92 | MW17-2D | MS | 30 | 0.5 | 10 | 23 | 225.00 |
| 9/28/92 | MW17-2D | MSD | | 0.5 | 10 | 24 | 235.00 |
| 9/30/92 | MW17-2D | MS | 97-98 | 0.5 | 10 | 19 | 185.00 |
| 9/30/92 | MW17-2D | MSD | | 0.5 | 10 | 18 | 175.00 |
| 10/26/92 | MW19-1D | MS | 20 | 0.5 | 10 | 16.8 | 163.00 |
| 10/26/92 | MW19-1D | MSD | | 0.5 | 10 | 14.5 | 140.00 |
| 9/23/92 | MW21-1D | MS | 5 | 0.5 | 10 | 12.4 | 119.00 |
| 9/23/92 | MW21-1D | MSD | | 0.5 | 10 | 14 | 135.00 |
| 9/25/92 | MW24-1D | MS | 25 | 0.5 | 10 | 18 | 175.00 |
| 9/25/92 | MW24-1D | MSD | | 0.5 | 10 | 16 | 155.00 |
| 9/1/92 | MW25-2I | MS | 35-37 | 0.5 | 10 | 19 | 185.00 |
| 9/1/92 | MW25-2I | MSD | | 0.5 | 10 | 22 | 215.00 |
| 9/11/92 | MW26-2I | MS | 39 | 0.5 | 10 | 3.6 | 31.00 |
| 9/11/92 | MW26-2I | MSD | | 0.5 | 10 | 3.8 | 33.00 |
| 9/24/92 | MW27-1B | MS | 129-130 | 0.5 | 10 | 14 | 135.00 |
| 9/24/92 | MW27-1B | MSD | | 0.5 | 10 | 16 | 155.00 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 0.5 | 10 | 4[illegible] | 42.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 10 | [illegible] | 35.00 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 0.5 | 10 | 3.3 | 28.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 10 | 3.4 | 29.00 |
| 10/27/92 | MW33-1D | MS | 0 | 0.5 | 10 | 15.7 | 152.00 |
| 10/27/92 | MW33-1D | MSD | | 0.5 | 10 | 16.1 | 156.00 |
| 11/2/92 | MW34-1D | MS | 5 | 0.5 | 10 | 17.4 | 169.00 |
| 11/2/92 | MW34-1D | MSD | | 0.5 | 10 | 20.4 | 199.00 |
| 11/4/92 | MW35-1D | MS | 5 | 0.5 | 10 | 23 | 225.00 |
| 11/4/92 | MW35-1D | MSD | | 0.5 | 10 | 24 | 235.00 |
| 12/15/92 | MW36-1D | MS | 5 | 0.5 | 10 | 23.8 | 233.00 |
| 12/15/92 | MW36-1D | MSD | | 0.5 | 10 | 23.3 | 228.00 |
| 12/17/92 | MW36-2I | MS | 53 | 0.48 | 10 | 21.8 | 213.20 |
| 12/17/92 | MW36-2I | MSD | | 0.48 | 10 | 21.4 | 209.20 |
| 1/7/93 | MW39-1D | MS | 125 | 0.5 | 10 | 12.4 | 119.00 |
| 1/7/93 | MW39-1D | MSD | | 0.5 | 10 | 13.1 | 126.00 |
| 8/27/92 | PZ32 | MS | 0 | 0.5 | 10 | 0.69 | 1.90 |
| 8/27/92 | PZ32 | MSD | | 0.5 | 10 | 0.65 | 1.50 |
| 7/18/92 | SB03 | MS | 15 | 0.5 | 10 | 0.5 | 0.00 |
| 7/18/92 | SB03 | MSD | | 0.5 | 10 | 0.5 | 0.00 |
| 7/21/92 | SB12 | MS | 15 | 0.3 | 10 | 0.3 | 0.00 |
| 7/21/92 | SB12 | MSD | | 0.21 | 10 | 0.21 | 0.00 |
| 11/19/92 | SB28 | MS | 51 | 0.5 | 10 | 18.1 | 176.00 |
| 11/19/92 | SB28 | MSD | | 0.5 | 10 | 18.6 | 181.00 |
| 11/8/92 | SB32 | MS | 46 | 0.5 | 10 | 0.5 | 0.00 |
| 11/8/92 | SB32 | MSD | | 0.5 | 10 | 14.5 | 140.00 |
| 11/8/92 | SB33 | MS | 15 | 0.5 | 10 | 15 | 145.00 |
| 11/8/92 | SB33 | MSD | | 0.5 | 10 | 16 | 155.00 |
| 11/8/92 | SB33 | MS | 48 | 0.5 | 10 | 19.9 | 194.00 |
| 11/8/92 | SB33 | MSD | | 0.5 | 10 | 18.3 | 178.00 |
| 11/7/92 | SB34 | MS | 45 | 0.5 | 10 | 24 | 235.00 |
| 11/7/92 | SB34 | MSD | | 0.5 | 10 | 23.7 | 232.00 |
| 10/21/92 | SB36 | MS | 5 | 0.5 | 10 | 17.4 | 169.00 |
| 10/21/92 | SB36 | MSD | | 0.5 | 10 | 15.9 | 154.00 |
| 10/21/92 | SB37 | MS | 5 | 0.5 | 10 | 19.8 | 193.00 |
| 10/21/92 | SB37 | MSD | | 0.5 | 10 | 15.9 | 154.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 0.5 | 10 | 19.7 | 192.00 |
| 10/25/92 | SB38 | MSD | | 0.5 | 10 | 19.4 | 189.00 |
| 10/25/92 | SB38 | MS | 55 | 0.5 | 10 | 17.8 | 173.00 |
| 10/25/92 | SB38 | MSD | | 0.5 | 10 | 17.5 | 170.00 |
| 10/23/92 | SB39 | MS | 0 | 0.5 | 10 | 20.5 | 200.00 |
| 10/23/92 | SB39 | MSD | | 0.5 | 10 | 17.9 | 174.00 |
| 10/22/92 | SB40 | MS | 65 | 0.5 | 10 | 19.4 | 189.00 |
| 10/22/92 | SB40 | MSD | | 0.5 | 10 | 16.9 | 164.00 |
| 10/24/92 | SB41 | MS | 0 | 0.5 | 10 | 24.2 | 237.00 |
| 10/24/92 | SB41 | MSD | | 0.5 | 10 | 23.3 | 228.00 |
| 10/23/92 | SB42 | MS | 55 | 0.5 | 10 | 14.8 | 143.00 |
| 10/23/92 | SB42 | MSD | | 0.5 | 10 | 17.6 | 171.00 |
| 10/24/92 | SB43 | MS | 0 | 0.5 | 10 | 26.6 | 261.00 |
| 10/24/92 | SB43 | MSD | | 0.5 | 10 | 25.2 | 247.00 |
| 11/9/92 | SB45 | MS | 55 | 0.5 | 10 | 19.1 | 186.00 |
| 11/9/92 | SB45 | MSD | | 0.5 | 10 | 15.4 | 149.00 |
| 11/10/92 | SB47 | MS | 10 | 0.5 | 10 | 24 | 235.00 |
| 11/10/92 | SB47 | MSD | | 0.5 | 10 | 24 | 235.00 |
| 11/11/92 | SB48 | MS | 53 | 0.5 | 10 | 19 | 185.00 |
| 11/11/92 | SB48 | MSD | | 0.5 | 10 | 22 | 215.00 |
| 11/17/92 | SB50 | MS | 30 | 0.5 | 10 | 19.9 | 194.00 |
| 11/17/92 | SB50 | MSD | | 0.5 | 10 | 23 | 225.00 |
| 11/20/92 | SB53 | MS | 80 | 0.5 | 10 | 20.7 | 202.00 |
| 11/20/92 | SB53 | MSD | | 0.5 | 10 | 18.9 | 184.00 |
| 11/21/92 | SB54 | MS | 80 | 0.5 | 10 | 17.7 | 172.00 |
| 11/21/92 | SB54 | MSD | | 0.5 | 10 | 19 | 185.00 |
| 11/21/92 | SB54 | MS | 85 | 0.5 | 10 | 15.8 | 153.00 |
| 11/21/92 | SB54 | MSD | | 0.5 | 10 | 17.6 | 171.00 |
| 11/23/92 | SB56 | MS | 55 | 0.5 | 10 | 16.9 | 164.00 |
| 11/23/92 | SB56 | MSD | | 0.5 | 10 | 19.3 | 188.00 |
| 11/23/92 | SB56 | MS | 85 | 0.5 | 10 | 16.2 | 157.00 |
| 11/23/92 | SB56 | MSD | | 0.5 | 10 | 15.7 | 152.00 |
| 11/24/92 | SB57 | MS | 50 | 0.5 | 10 | 18.8 | 183.00 |
| 11/24/92 | SB57 | MSD | | 0.5 | 10 | 18.3 | 178.00 |
| 11/30/92 | SB58 | MS | 80 | 0.5 | 10 | 21.3 | 208.00 |
| 11/30/92 | SB58 | MSD | | 0.5 | 10 | 20.1 | 196.00 |
| 12/1/92 | SB59 | MS | 95 | 0.5 | 10 | 28.3 | 278.00 |
| 12/1/92 | SB59 | MSD | | 0.5 | 10 | 28.2 | 277.00 |
| 12/2/92 | SB60 | MS | 70 | 0.5 | 10 | 21.4 | 209.00 |
| 12/2/92 | SB60 | MSD | | 0.5 | 10 | 21.9 | 214.00 |
| 12/3/92 | SB61 | MS | 80 | 0.5 | 10 | 21.3 | 208.00 |
| 12/3/92 | SB61 | MSD | | 0.5 | 10 | 19.2 | 187.00 |
| 12/4/92 | SB62 | MS | 60 | 0.5 | 10 | 20 | 195.00 |
| 12/4/92 | SB62 | MSD | | 0.5 | 10 | 20.2 | 197.00 |
| 12/5/92 | SB63 | MS | 80 | 0.5 | 10 | 20.3 | 198.00 |
| 12/5/92 | SB63 | MSD | | 0.5 | 10 | 17.4 | 169.00 |
| 12/9/92 | SB65 | MS | 85 | 0.5 | 10 | 20.6 | 201.00 |
| 12/9/92 | SB65 | MSD | | 0.5 | 10 | 21.1 | 206.00 |
| 12/21/92 | SB66 | MS | 15 | 0.5 | 10 | 12.4 | 119.00 |
| 12/21/92 | SB66 | MSD | | 0.5 | 10 | 12 | 115.00 |
| 3/16/93 | SB67 | MS | 11 | 0.5 | 10 | 11 | 105.00 |
| 3/16/93 | SB67 | MSD | | 0.5 | 10 | 11 | 105.00 |
| 3/17/93 | SB68 | MS | 55 | 0.5 | 10 | 10 | 95.00 |
| 3/17/93 | SB68 | MSD | | 0.5 | 10 | 10 | 95.00 |
| 3/18/93 | SB69 | MS | 0 | 0.5 | 10 | 11.4 | 109.00 |
| 3/18/93 | SB69 | MSD | | 0.5 | 10 | 10.3 | 98.00 |
| 3/19/93 | SB70 | MS | 40 | 0.5 | 10 | 8.6 | 81.00 |
| 3/19/93 | SB70 | MSD | | 0.5 | 10 | 9.1 | 86.00 |
| 3/20/93 | SB71 | MS | 55 | 0.5 | 10 | 6 | 55.00 |
| 3/20/93 | SB71 | MSD | | 0.5 | 10 | 7.3 | 68.00 |
| 3/21/93 | SB72 | MS | 45 | 0.5 | 10 | 8.4 | 79.00 |
| 3/21/93 | SB72 | MSD | | 0.5 | 10 | 7.3 | 68.00 |
| 3/21/93 | SB72 | MS | 75 | 0.5 | 10 | 7.2 | 67.00 |
| 3/21/93 | SB72 | MSD | | 0.5 | 10 | 7.8 | 73.00 |

| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR TCE IN SOILS | | | | | | |
|---|---|---|---|---|---|---|---|
| | (Concentrations in micrograms per kilogram) | | | | | | |
| | %R = Percent recovery | | | | | | |
| Date | Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
| 7/29/92 | MW04-1S | MS | 15 | 0.5 | 15 | 0.79 | 1.93 |
| 7/29/92 | MW04-1S | MSD | | 0.5 | 15 | 0.73 | 1.53 |
| 9/12/92 | MW13-2B | MS | 135 | 0.5 | 15 | 9.2 | 58.00 |
| 9/12/92 | MW13-2B | MSD | | 0.5 | 15 | 8.95 | 56.33 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 0.5 | 15 | 9.91 | 62.73 |
| 9/13/92 | MW13-2B | MSD | | 0.5 | 15 | 9.31 | 58.73 |
| 9/14/92 | MW16-1D | MS | 5 | 0.5 | 15 | 11 | 70.00 |
| 9/14/92 | MW16-1D | MSD | | 0.5 | 15 | 10.5 | 66.67 |
| 9/28/92 | MW17-2D | MS | 30 | 0.5 | 15 | 51 | 336.67 |
| 9/28/92 | MW17-2D | MSD | | 0.5 | 15 | 54 | 356.67 |
| 9/30/92 | MW17-2D | MS | 97-98 | 0.5 | 15 | 37 | 243.33 |
| 9/30/92 | MW17-2D | MSD | | 0.5 | 15 | 36 | 236.67 |
| 10/26/92 | MW19-1D | MS | 20 | 0.5 | 15 | 33.2 | 218.00 |
| 10/26/92 | MW19-1D | MSD | | 0.5 | 15 | 28.9 | 189.33 |
| 9/23/92 | MW21-1D | MS | 5 | 0.5 | 15 | 24 | 156.67 |
| 9/23/92 | MW21-1D | MSD | | 0.5 | 15 | 26 | 170.00 |
| 9/25/92 | MW24-1D | MS | 25 | 0.5 | 15 | 41 | 270.00 |
| 9/25/92 | MW24-1D | MSD | | 0.5 | 15 | 38 | 250.00 |
| 9/1/92 | MW25-2I | MS | 35-37 | 0.5 | 15 | 39 | 256.67 |
| 9/1/92 | MW25-2I | MSD | | 0.5 | 15 | 44 | 290.00 |
| 9/11/92 | MW26-2I | MS | 39 | 0.5 | 15 | 7.8 | 48.67 |
| 9/11/92 | MW26-2I | MSD | | 0.5 | 15 | 8.2 | 51.33 |
| 9/24/92 | MW27-1B | MS | 129-130 | 0.5 | 15 | 28 | 183.33 |
| 9/24/92 | MW27-1B | MSD | | 0.5 | 15 | 32 | 210.00 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 0.5 | 15 | 10.1 | 64.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 15 | 9.1 | 57.33 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 0.5 | 15 | 6.8 | 42.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 15 | 7.1 | 44.00 |
| 10/27/92 | MW33-1D | MS | 0 | 0.5 | 15 | 33.1 | 217.33 |
| 10/27/92 | MW33-1D | MSD | | 0.5 | 15 | 34.3 | 225.33 |
| 11/2/92 | MW34-1D | MS | 5 | 0.5 | 15 | 35.7 | 234.67 |
| 11/2/92 | MW34-1D | MSD | | 0.5 | 15 | 41.9 | 276.00 |
| 11/4/92 | MW35-1D | MS | 5 | 0.5 | 15 | 44 | 290.00 |
| 11/4/92 | MW35-1D | MSD | | 0.5 | 15 | 47 | 310.00 |
| 12/15/92 | MW36-1D | MS | 5 | 0.5 | 15 | 45.8 | 302.00 |
| 12/15/92 | MW36-1D | MSD | | 0.5 | 15 | 43.3 | 285.33 |
| 12/17/92 | MW36-2I | MS | 53 | 2.3 | 15 | 40.8 | 256.67 |
| 12/17/92 | MW36-2I | MSD | | 2.3 | 15 | 39.7 | 249.33 |
| 1/7/93 | MW39-1D | MS | 125 | 0.5 | 15 | 21.1 | 137.33 |
| 1/7/93 | MW39-1D | MSD | | 0.5 | 15 | 22.5 | 146.67 |
| 8/27/92 | PZ32 | MS | 0 | 0.5 | 15 | 1.5 | 6.67 |
| 8/27/92 | PZ32 | MSD | | 0.5 | 15 | 1.5 | 6.67 |
| 7/18/92 | SB03 | MS | 15 | 0.5 | 15 | 0.5 | 0.00 |
| 7/18/92 | SB03 | MSD | | 0.5 | 15 | 0.5 | 0.00 |
| 7/21/92 | SB12 | MS | 15 | 0.5 | 15 | 0.6 | 0.67 |
| 7/21/92 | SB12 | MSD | | 0.37 | 15 | 0.37 | 0.00 |
| 11/19/92 | SB28 | MS | 51 | 0.5 | 15 | 36.9 | 242.67 |
| 11/19/92 | SB28 | MSD | | 0.5 | 15 | 35.8 | 235.33 |
| 11/8/92 | SB32 | MS | 46 | 0.5 | 15 | 0.5 | 0.00 |
| 11/8/92 | SB32 | MSD | | 0.5 | 15 | 30.3 | 198.67 |
| 11/8/92 | SB33 | MS | 15 | 0.5 | 15 | 33.1 | 217.33 |
| 11/8/92 | SB33 | MSD | | 0.5 | 15 | 35.2 | 231.33 |
| 11/8/92 | SB33 | MS | 48 | 0.5 | 15 | 39.4 | 259.33 |
| 11/8/92 | SB33 | MSD | | 0.5 | 15 | 36.5 | 240.00 |
| 11/7/92 | SB34 | MS | 45 | 0.5 | 15 | 49.4 | 326.00 |
| 11/7/92 | SB34 | MSD | | 0.5 | 15 | 44.5 | 293.33 |
| 10/21/92 | SB36 | MS | 5 | 0.5 | 15 | 31.8 | 208.67 |
| 10/21/92 | SB36 | MSD | | 0.5 | 15 | 29.1 | 190.67 |
| 10/21/92 | SB37 | MS | 5 | 0.5 | 15 | 36 | 236.67 |
| 10/21/92 | SB37 | MSD | | 0.5 | 15 | 28.3 | 185.33 |

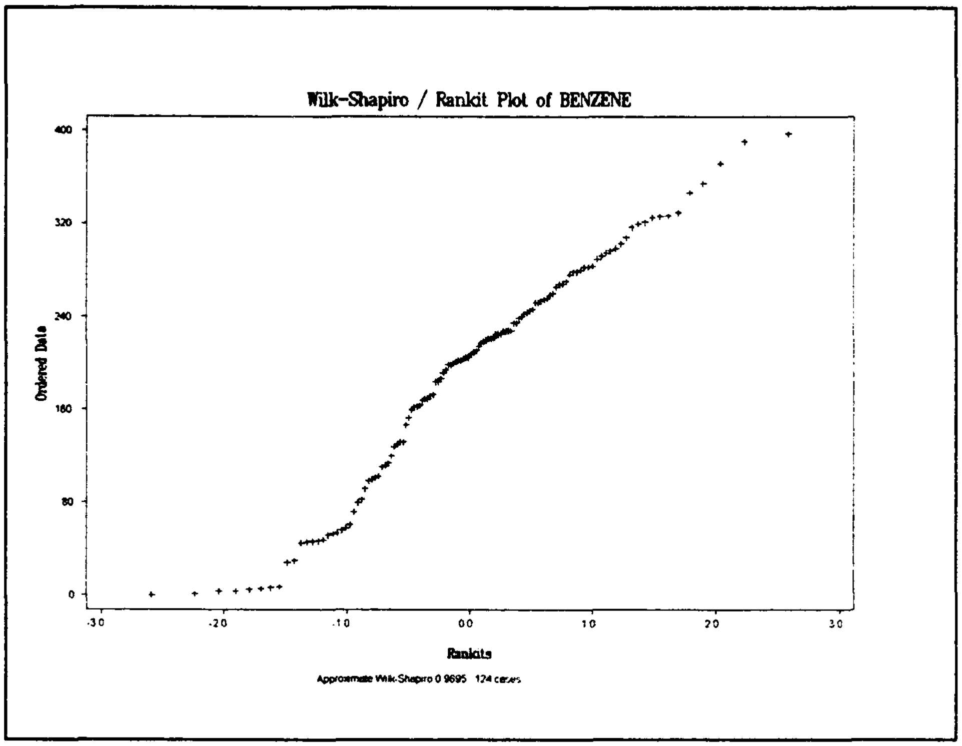
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 0.5 | 15 | 37.4 | 246.00 |
| 10/25/92 | SB38 | MSD | | 0.5 | 15 | 36.5 | 240.00 |
| 10/25/92 | SB38 | MS | 55 | 0.5 | 15 | 30 | 196.67 |
| 10/25/92 | SB38 | MSD | | 0.5 | 15 | 30.5 | 200.00 |
| 10/23/92 | SB39 | MS | 0 | 0.5 | 15 | 40.5 | 266.67 |
| 10/23/92 | SB39 | MSD | | 0.5 | 15 | 34.7 | 228.00 |
| 10/22/92 | SB40 | MS | 65 | 0.5 | 15 | 34.9 | 229.33 |
| 10/22/92 | SB40 | MSD | | 0.5 | 15 | 30 | 196.67 |
| 10/24/92 | SB41 | MS | 0 | 0.5 | 15 | 42.7 | 281.33 |
| 10/24/92 | SB41 | MSD | | 0.5 | 15 | 41.7 | 274.67 |
| 10/23/92 | SB42 | MS | 55 | 0.5 | 15 | 28.8 | 188.67 |
| 10/23/92 | SB42 | MSD | | 0.5 | 15 | 34.6 | 227.33 |
| 10/24/92 | SB43 | MS | 0 | 0.5 | 15 | 49.2 | 324.67 |
| 10/24/92 | SB43 | MSD | | 0.5 | 15 | 45.1 | 297.33 |
| 11/9/92 | SB45 | MS | 55 | 0.5 | 15 | 35.2 | 231.33 |
| 11/9/92 | SB45 | MSD | | 0.5 | 15 | 29.7 | 194.67 |
| 11/10/92 | SB47 | MS | 10 | 0.5 | 15 | 53 | 350.00 |
| 11/10/92 | SB47 | MSD | | 0.5 | 15 | 49 | 323.33 |
| 11/11/92 | SB48 | MS | 53 | 0.5 | 15 | 40 | 263.33 |
| 11/11/92 | SB48 | MSD | | 0.5 | 15 | 41 | 270.00 |
| 11/17/92 | SB50 | MS | 30 | 0.5 | 15 | 42.45 | 279.67 |
| 11/17/92 | SB50 | MSD | | 0.5 | 15 | 46.6 | 307.33 |
| 11/20/92 | SB53 | MS | 80 | 0.5 | 15 | 35 | 230.00 |
| 11/20/92 | SB53 | MSD | | 0.5 | 15 | 35.1 | 230.67 |
| 11/21/92 | SB54 | MS | 80 | 0.5 | 15 | 38.8 | 255.33 |
| 11/21/92 | SB54 | MSD | | 0.5 | 15 | 43.6 | 287.33 |
| 11/21/92 | SB54 | MS | 85 | 0.5 | 15 | 26.8 | 175.33 |
| 11/21/92 | SB54 | MSD | | 0.5 | 15 | 30.2 | 198.00 |
| 11/23/92 | SB56 | MS | 55 | 0.5 | 15 | 30 | 196.67 |
| 11/23/92 | SB56 | MSD | | 0.5 | 15 | 24.6 | 160.67 |
| 11/23/92 | SB56 | MS | 85 | 0.5 | 15 | 29.4 | 192.67 |
| 11/23/92 | SB56 | MSD | | 0.5 | 15 | 27.9 | 182.67 |
| 11/24/92 | SB57 | MS | 50 | 0.5 | 15 | 34.2 | 224.67 |
| 11/24/92 | SB57 | MSD | | 0.5 | 15 | 32.4 | 212.67 |
| 11/30/92 | SB58 | MS | 80 | 0.5 | 15 | 41.5 | 273.33 |
| 11/30/92 | SB58 | MSD | | 0.5 | 15 | 40 | 263.33 |
| 12/1/92 | SB59 | MS | 95 | 0.5 | 15 | 55.1 | 364.00 |
| 12/1/92 | SB59 | MSD | | 0.5 | 15 | 54.3 | 358.67 |
| 12/2/92 | SB60 | MS | 70 | 0.5 | 15 | 39.5 | 260.00 |
| 12/2/92 | SB60 | MSD | | 0.5 | 15 | 40 | 263.33 |
| 12/3/92 | SB61 | MS | 80 | 0.5 | 15 | 39.6 | 260.67 |
| 12/3/92 | SB61 | MSD | | 0.5 | 15 | 35.4 | 232.67 |
| 12/4/92 | SB62 | MS | 60 | 0.5 | 15 | 36.7 | 241.33 |
| 12/4/92 | SB62 | MSD | | 0.5 | 15 | 37.8 | 248.67 |
| 12/5/92 | SB63 | MS | 80 | 0.5 | 15 | 36.7 | 241.33 |
| 12/5/92 | SB63 | MSD | | 0.5 | 15 | 32.4 | 212.67 |
| 12/9/92 | SB65 | MS | 85 | 0.5 | 15 | 37.7 | 248.00 |
| 12/9/92 | SB65 | MSD | | 0.5 | 15 | 38.4 | 252.67 |
| 12/21/92 | SB66 | MS | 15 | 0.96 | 15 | 28.9 | 186.27 |
| 12/21/92 | SB66 | MSD | | 0.96 | 15 | 29.4 | 189.60 |
| 3/16/93 | SB67 | MS | 11 | 0.5 | 15 | 21 | 136.67 |
| 3/16/93 | SB67 | MSD | | 0.5 | 15 | 22 | 143.33 |
| 3/17/93 | SB68 | MS | 55 | 0.5 | 15 | 20 | 130.00 |
| 3/17/93 | SB68 | MSD | | 0.5 | 15 | 20 | 130.00 |
| 3/18/93 | SB69 | MS | 0 | 0.5 | 15 | 21.7 | 141.33 |
| 3/18/93 | SB69 | MSD | | 0.5 | 15 | 19.4 | 126.00 |
| 3/19/93 | SB70 | MS | 40 | 1.9 | 15 | 18.2 | 108.67 |
| 3/19/93 | SB70 | MSD | | 1.9 | 15 | 18.8 | 112.67 |
| 3/20/93 | SB71 | MS | 55 | 0.5 | 15 | 11.6 | 74.00 |
| 3/20/93 | SB71 | MSD | | 0.5 | 15 | 13.8 | 88.67 |
| 3/21/93 | SB72 | MS | 45 | 0.71 | 15 | 18.6 | 119.27 |
| 3/21/93 | SB72 | MSD | | 0.71 | 15 | 15.2 | 96.60 |
| 3/21/93 | SB72 | MS | 75 | 0.5 | 15 | 13.6 | 87.33 |
| 3/21/93 | SB72 | MSD | | 0.5 | 15 | 15.1 | 97.33 |

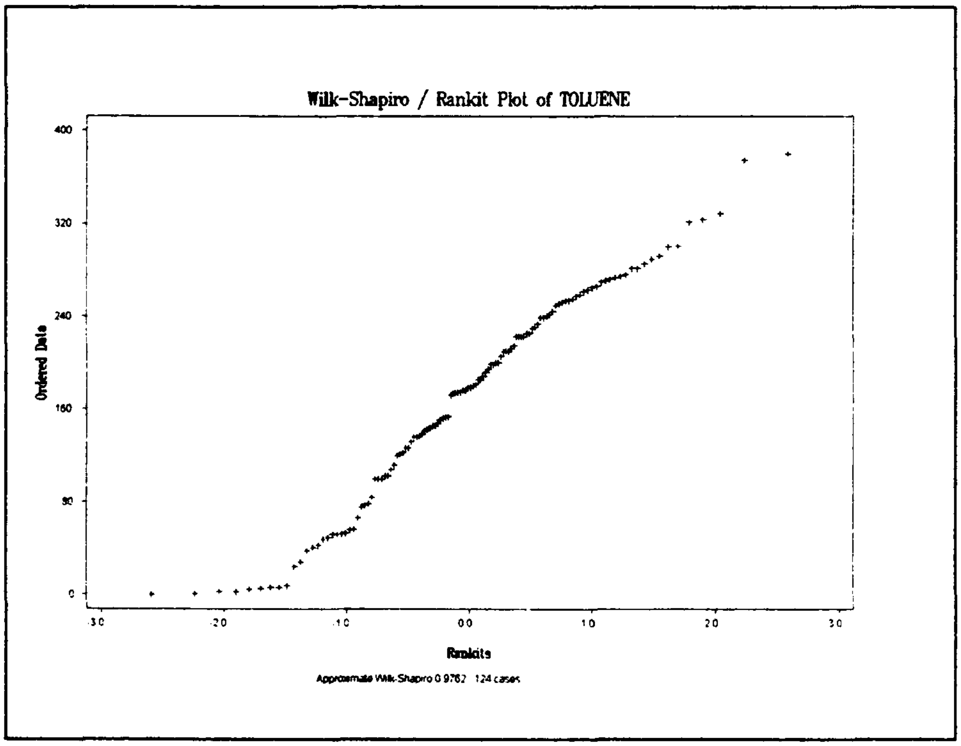
| | FIELD ANALYTICAL MATRIX SPIKE RESULTS FOR PCE IN SOILS | | | | | |
|---|---|---|---|---|---|---|
| | (Concentrations in micrograms per kilogram) | | | | | |
| | %R = Percent recovery | | | | | |
| Date | Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |

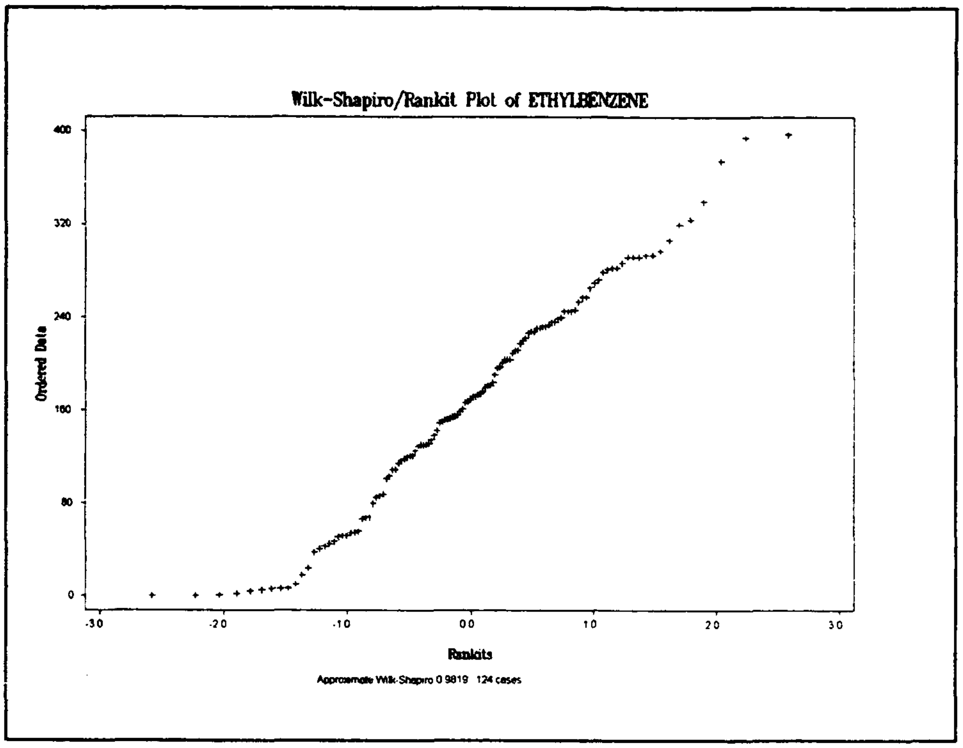
| Date | Sample # | MS/MSD | Depth | Unspiked Meas Conc. | Spike Conc. | Spiked Meas Conc. | %R |
|---|---|---|---|---|---|---|---|
| 7/29/92 | MW04-1S | MS | 15 | 0.34 | 10 | 0.34 | 0.00 |
| 7/29/92 | MW04-1S | MSD | | 0.34 | 10 | 0.34 | 0.00 |
| 9/12/92 | MW13-2B | MS | 135 | 0.5 | 10 | 4.22 | 37.20 |
| 9/12/92 | MW13-2B | MSD | | 0.5 | 10 | 4.26 | 37.60 |
| 9/13/92 | MW13-2B | MS | 201-201.5 | 0.5 | 10 | 4.76 | 42.60 |
| 9/13/92 | MW13-2B | MSD | | 0.5 | 10 | 4.71 | 42.10 |
| 9/14/92 | MW16-1D | MS | 5 | 0.5 | 10 | 5 | 45.00 |
| 9/14/92 | MW16-1D | MSD | | 0.5 | 10 | 4.9 | 44.00 |
| 9/28/92 | MW17-2D | MS | 30 | 0.5 | 10 | 28 | 275.00 |
| 9/28/92 | MW17-2D | MSD | | 0.5 | 10 | 31 | 305.00 |
| 9/30/92 | MW17-2D | MS | 97-98 | 0.5 | 10 | 17 | 165.00 |
| 9/30/92 | MW17-2D | MSD | | 0.5 | 10 | 17 | 165.00 |
| 10/26/92 | MW19-1D | MS | 20 | 0.5 | 10 | 19.2 | 187.00 |
| 10/26/92 | MW19-1D | MSD | | 0.5 | 10 | 16.1 | 156.00 |
| 9/23/92 | MW21-1D | MS | 5 | 0.5 | 10 | 13 | 125.00 |
| 9/23/92 | MW21-1D | MSD | | 0.5 | 10 | 14 | 135.00 |
| 9/25/92 | MW24-1D | MS | 25 | 0.5 | 10 | 20 | 195.00 |
| 9/25/92 | MW24-1D | MSD | | 0.5 | 10 | 22 | 215.00 |
| 9/1/92 | MW25-2I | MS | 35-37 | 0.5 | 10 | 20 | 195.00 |
| 9/1/92 | MW25-2I | MSD | | 0.5 | 10 | 22 | 215.00 |
| 9/11/92 | MW26-2I | MS | 39 | 0.5 | 10 | 4.3 | 38.00 |
| 9/11/92 | MW26-2I | MSD | | 0.5 | 10 | 3.9 | 34.00 |
| 9/24/92 | MW27-1B | MS | 129-130 | 0.5 | 10 | 14 | 135.00 |
| 9/24/92 | MW27-1B | MSD | | 0.5 | 10 | 18 | 175.00 |
| 9/15/92 | MW28-1B | MS | 160-160.5 | 0.5 | 10 | 4.5 | 40.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 10 | 4.1 | 36.00 |
| 9/15/92 | MW28-1B | MS | 81-81.5 | 0.5 | 10 | 2.7 | 22.00 |
| 9/15/92 | MW28-1B | MSD | | 0.5 | 10 | 3.2 | 27.00 |
| 10/27/92 | MW33-1D | MS | 0 | 0.5 | 10 | 14.8 | 143.00 |
| 10/27/92 | MW33-1D | MSD | | 0.5 | 10 | 17.8 | 173.00 |
| 11/2/92 | MW34-1D | MS | 5 | 0.5 | 10 | 15.2 | 147.00 |
| 11/2/92 | MW34-1D | MSD | | 0.5 | 10 | 16.6 | 161.00 |
| 11/4/92 | MW35-1D | MS | 5 | 0.5 | 10 | 22 | 215.00 |
| 11/4/92 | MW35-1D | MSD | | 0.5 | 10 | 27 | 265.00 |
| 12/15/92 | MW36-1D | MS | 5 | 0.5 | 10 | 24.1 | 236.00 |
| 12/15/92 | MW36-1D | MSD | | 0.5 | 10 | 22.8 | 223.00 |
| 12/17/92 | MW36-2I | MS | 53 | 0.5 | 10 | 20.1 | 196.00 |
| 12/17/92 | MW36-2I | MSD | | 0.5 | 10 | 19.6 | 191.00 |
| 1/7/93 | MW39-1D | MS | 125 | 0.5 | 10 | 10.1 | 96.00 |
| 1/7/93 | MW39-1D | MSD | | 0.5 | 10 | 11.5 | 110.00 |
| 8/27/92 | PZ32 | MS | 0 | 0.5 | 10 | 0.75 | 2.50 |
| 8/27/92 | PZ32 | MSD | | 0.5 | 10 | 0.73 | 2.30 |
| 7/18/92 | SB03 | MS | 15 | 0.5 | 10 | 0.5 | 0.00 |
| 7/18/92 | SB03 | MSD | | 0.5 | 10 | 0.5 | 0.00 |
| 7/21/92 | SB12 | MS | 15 | 0.24 | 10 | 0.24 | 0.00 |
| 7/21/92 | SB12 | MSD | | 0.16 | 10 | 0.16 | 0.00 |
| 11/19/92 | SB28 | MS | 51 | 0.5 | 10 | 16.1 | 156.00 |
| 11/19/92 | SB28 | MSD | | 0.5 | 10 | 18.3 | 178.00 |
| 11/8/92 | SB32 | MS | 46 | 0.5 | 10 | 0.5 | 0.00 |
| 11/8/92 | SB32 | MSD | | 0.5 | 10 | 15.2 | 147.00 |
| 11/8/92 | SB33 | MS | 15 | 0.74 | 10 | 17 | 162.60 |
| 11/8/92 | SB33 | MSD | | 0.74 | 10 | 18.4 | 176.60 |
| 11/8/92 | SB33 | MS | 48 | 0.73 | 10 | 20.3 | 195.70 |
| 11/8/92 | SB33 | MSD | | 0.73 | 10 | 19.7 | 189.70 |
| 11/7/92 | SB34 | MS | 45 | 0.5 | 10 | 22.2 | 217.00 |
| 11/7/92 | SB34 | MSD | | 0.5 | 10 | 24.2 | 237.00 |
| 10/21/92 | SB36 | MS | 5 | 0.56 | 10 | 15.5 | 149.40 |
| 10/21/92 | SB36 | MSD | | 0.56 | 10 | 14.5 | 139.40 |
| 10/21/92 | SB37 | MS | 5 | 0.5 | 10 | 16.3 | 158.00 |
| 10/21/92 | SB37 | MSD | | 0.5 | 10 | 13.5 | 130.00 |

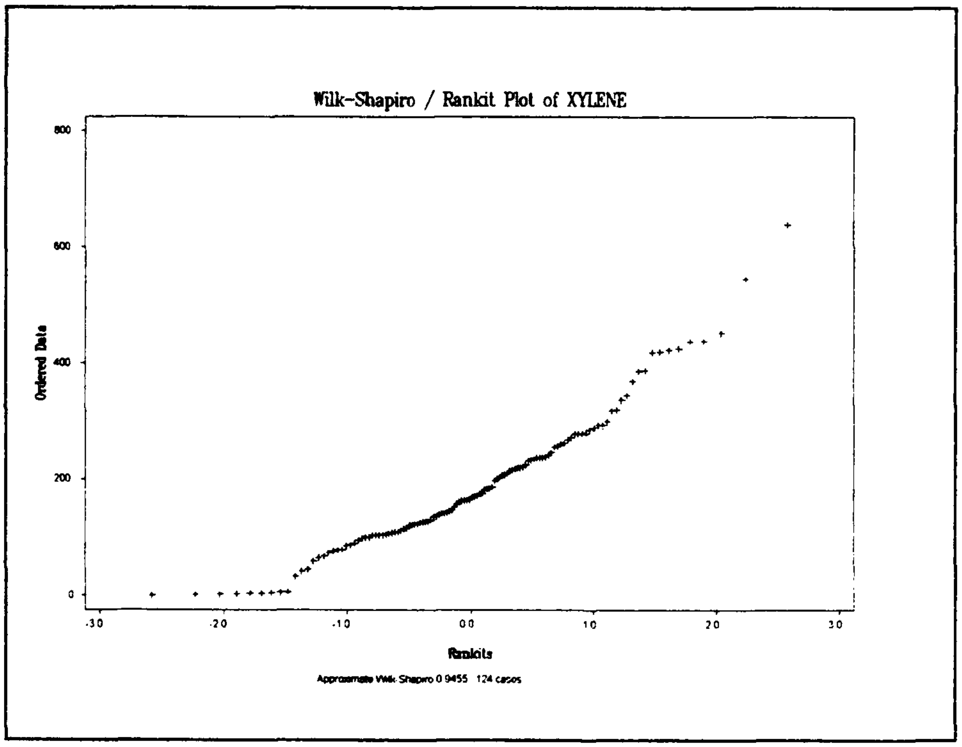
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10/25/92 | SB38 | MS | 5 | 0.5 | 10 | 19 | 185.00 |
| 10/25/92 | SB38 | MSD | | 0.5 | 10 | 19.5 | 190.00 |
| 10/25/92 | SB38 | MS | 55 | 0.5 | 10 | 14.2 | 137.00 |
| 10/25/92 | SB38 | MSD | | 0.5 | 10 | 16.8 | 163.00 |
| 10/23/92 | SB39 | MS | 0 | 0.5 | 10 | 19.8 | 193.00 |
| 10/23/92 | SB39 | MSD | | 0.5 | 10 | 18.5 | 180.00 |
| 10/22/92 | SB40 | MS | 65 | 0.5 | 10 | 16.2 | 157.00 |
| 10/22/92 | SB40 | MSD | | 0.5 | 10 | 14.9 | 144.00 |
| 10/24/92 | SB41 | MS | 0 | 0.5 | 10 | 20.9 | 204.00 |
| 10/24/92 | SB41 | MSD | | 0.5 | 10 | 22.4 | 219.00 |
| 10/23/92 | SB42 | MS | 55 | 0.5 | 10 | 15.3 | 148.00 |
| 10/23/92 | SB42 | MSD | | 0.5 | 10 | 17.8 | 173.00 |
| 10/24/92 | SB43 | MS | 0 | 0.5 | 10 | 25.4 | 249.00 |
| 10/24/92 | SB43 | MSD | | 0.5 | 10 | 24 | 235.00 |
| 11/9/92 | SB45 | MS | 55 | 0.5 | 10 | 15.4 | 149.00 |
| 11/9/92 | SB45 | MSD | | 0.5 | 10 | 13.9 | 134.00 |
| 11/10/92 | SB47 | MS | 10 | 4.3 | 10 | 31 | 267.00 |
| 11/10/92 | SB47 | MSD | | 4.3 | 10 | 30 | 257.00 |
| 11/11/92 | SB48 | MS | 53 | 0.5 | 10 | 18 | 175.00 |
| 11/11/92 | SB48 | MSD | | 0.5 | 10 | 18 | 175.00 |
| 11/17/92 | SB50 | MS | 30 | 0.5 | 10 | 21.7 | 212.00 |
| 11/17/92 | SB50 | MSD | | 0.5 | 10 | 22.9 | 224.00 |
| 11/20/92 | SB53 | MS | 80 | 1.8 | 10 | 19.6 | 178.00 |
| 11/20/92 | SB53 | MSD | | 1.8 | 10 | 19.9 | 181.00 |
| 11/21/92 | SB54 | MS | 80 | 0.71 | 10 | 16.3 | 155.90 |
| 11/21/92 | SB54 | MSD | | 0.71 | 10 | 19.8 | 190.90 |
| 11/21/92 | SB54 | MS | 85 | 0.64 | 10 | 13.4 | 127.60 |
| 11/21/92 | SB54 | MSD | | 0.64 | 10 | 17 | 163.60 |
| 11/23/92 | SB56 | MS | 55 | 0.5 | 10 | 14.6 | 141.00 |
| 11/23/92 | SB56 | MSD | | 0.5 | 10 | 18.2 | 177.00 |
| 11/23/92 | SB56 | MS | 85 | 0.5 | 10 | 15.1 | 146.00 |
| 11/23/92 | SB56 | MSD | | 0.5 | 10 | 14.1 | 136.00 |
| 11/24/92 | SB57 | MS | 50 | 2.1 | 10 | 24.2 | 221.00 |
| 11/24/92 | SB57 | MSD | | 2.1 | 10 | 25.2 | 231.00 |
| 11/30/92 | SB58 | MS | 80 | 0.5 | 10 | 21.5 | 210.00 |
| 11/30/92 | SB58 | MSD | | 0.5 | 10 | 21.8 | 213.00 |
| 12/1/92 | SB59 | MS | 95 | 0.5 | 10 | 28 | 275.00 |
| 12/1/92 | SB59 | MSD | | 0.5 | 10 | 28.4 | 279.00 |
| 12/2/92 | SB60 | MS | 70 | 0.5 | 10 | 19 | 185.00 |
| 12/2/92 | SB60 | MSD | | 0.5 | 10 | 20.5 | 200.00 |
| 12/3/92 | SB61 | MS | 80 | 0.5 | 10 | 21.3 | 208.00 |
| 12/3/92 | SB61 | MSD | | 0.5 | 10 | 20 | 195.00 |
| 12/4/92 | SB62 | MS | 60 | 0.5 | 10 | 19.9 | 194.00 |
| 12/4/92 | SB62 | MSD | | 0.5 | 10 | 21.7 | 212.00 |
| 12/5/92 | SB63 | MS | 80 | 0.5 | 10 | 18.3 | 178.00 |
| 12/5/92 | SB63 | MSD | | 0.5 | 10 | 18.3 | 178.00 |
| 12/9/92 | SB65 | MS | 85 | 0.5 | 10 | 19.4 | 189.00 |
| 12/9/92 | SB65 | MSD | | 0.5 | 10 | 20.7 | 202.00 |
| 12/21/92 | SB66 | MS | 15 | 2.4 | 10 | 13.6 | 112.00 |
| 12/21/92 | SB66 | MSD | | 2.4 | 10 | 12.7 | 103.00 |
| 3/16/93 | SB67 | MS | 11 | 0.5 | 10 | 11 | 105.00 |
| 3/16/93 | SB67 | MSD | | 0.5 | 10 | 11 | 105.00 |
| 3/17/93 | SB68 | MS | 55 | 0.5 | 10 | 11 | 105.00 |
| 3/17/93 | SB68 | MSD | | 0.5 | 10 | 11 | 105.00 |
| 3/18/93 | SB69 | MS | 0 | 0.5 | 10 | 10.6 | 101.00 |
| 3/18/93 | SB69 | MSD | | 0.5 | 10 | 9.4 | 89.00 |
| 3/19/93 | SB70 | MS | 40 | 1.7 | 10 | 10.7 | 90.00 |
| 3/19/93 | SB70 | MSD | | 1.7 | 10 | 11.3 | 96.00 |
| 3/20/93 | SB71 | MS | 55 | 0.48 | 10 | 5.9 | 54.20 |
| 3/20/93 | SB71 | MSD | | 0.48 | 10 | 7.4 | 69.20 |
| 3/21/93 | SB72 | MS | 45 | 1 | 10 | 8.9 | 79.00 |
| 3/21/93 | SB72 | MSD | | 1 | 10 | 8.3 | 73.00 |
| 3/21/93 | SB72 | MS | 75 | 0.5 | 10 | 6.7 | 62.00 |
| 3/21/93 | SB72 | MSD | | 0.5 | 10 | 7.5 | 70.00 |

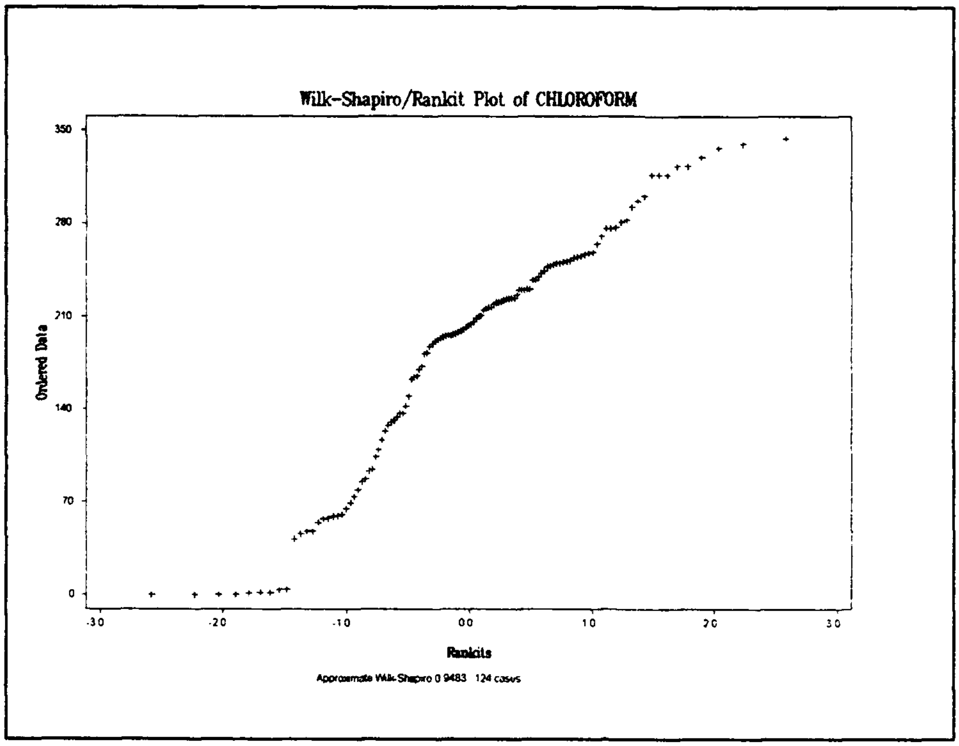
**APPENDIX F**
**Wilk-Shapiro Results of Percent Recovery Values in Soil Data**

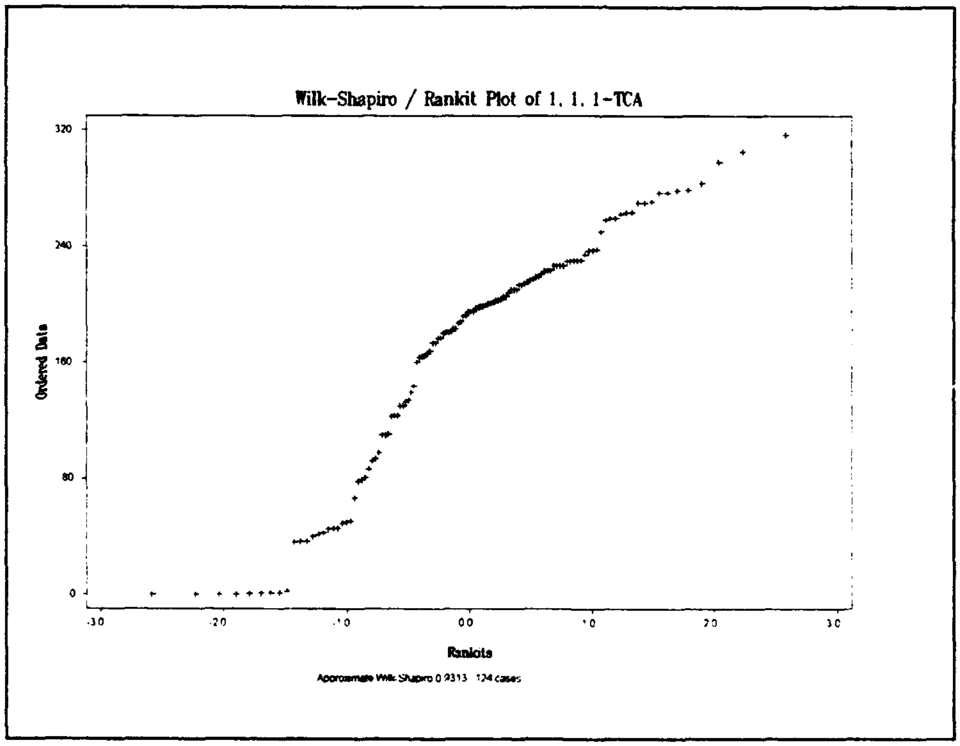

Wilk-Shapiro / Rankit Plot of BENZENE
400
320
240
160
80
0
Ordered Data
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Rankits
Approximate Wilk-Shapiro 0.9695 124 cases

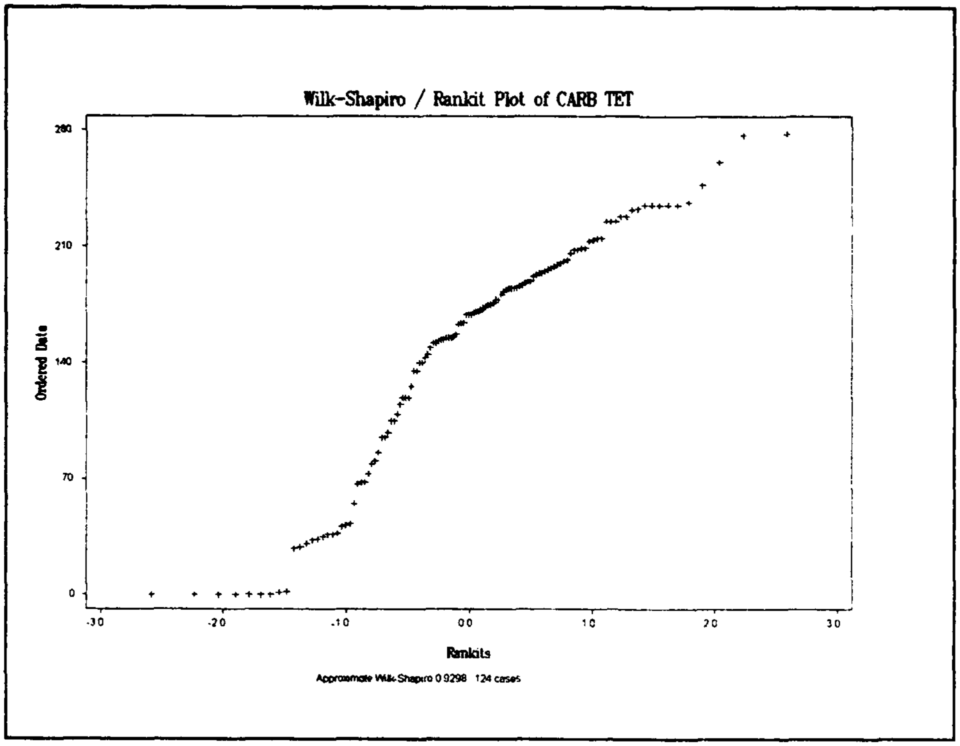

Wilk-Shapiro / Rankit Plot of TOLUENE
400
320
240
160
80
0
Ordered Data
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Rankits
Approximate Wilk-Shapiro 0.9762 124 cases


Wilk-Shapiro/Rankit Plot of ETHYLBENZENE
Ordered Data
Rankits
Approximate Wilk-Shapiro 0.9819 124 cases

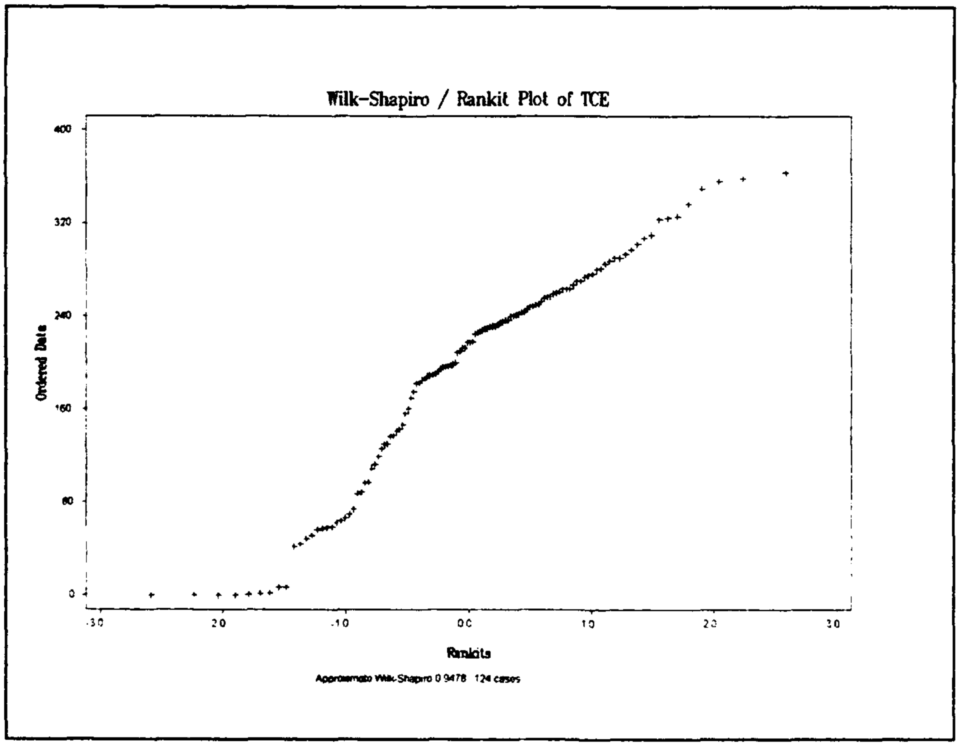

Wilk-Shapiro / Rankit Plot of XYLENE
Ordered Data
Rankits
Approximate Wilk-Shapiro 0.9455 124 cases


Wilk-Shapiro/Rankit Plot of CHLOROFORM
350
280
210
140
70
0
Ordered Data
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Rankits
Approximate Wilk-Shapiro 0.9483 124 cases

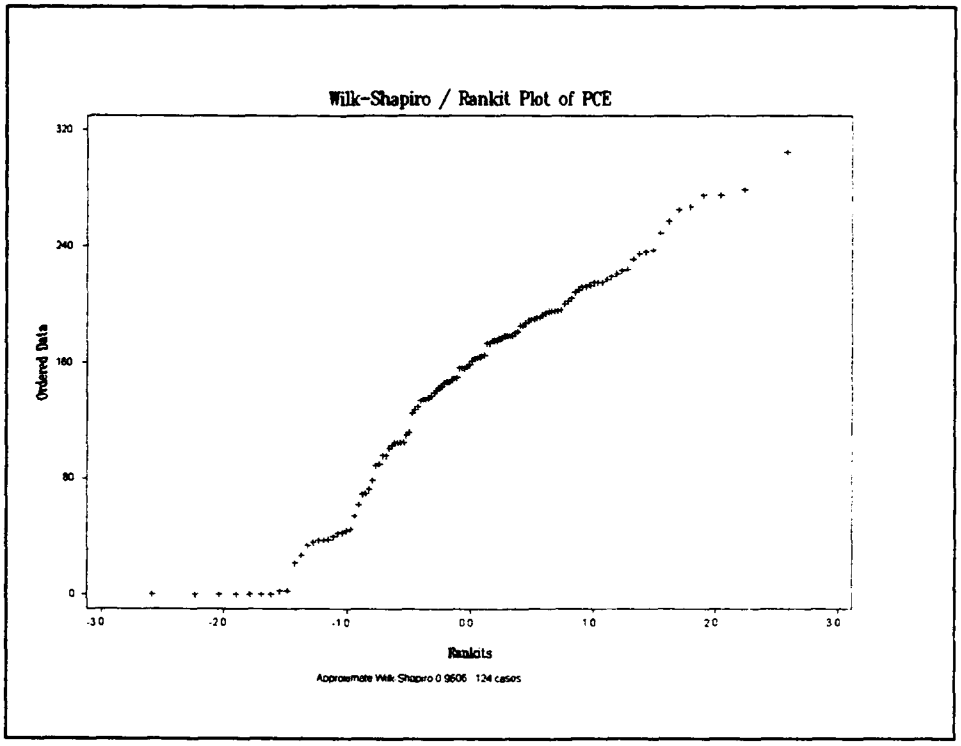

Wilk-Shapiro / Rankit Plot of 1, 1, 1-TCA
320
240
160
80
0
Ordered Data
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Rankits
Approximate Wilk-Shapiro 0.9313 124 cases



Wilk-Shapiro / Rankit Plot of CARB TET
Ordered Data
Rankits
Approximate Wilk-Shapiro 0.9298 124 cases

Wilk-Shapiro / Rankit Plot of TCE
Ordered Data
Rankits
Approximate Wilk-Shapiro 0.9478 124 cases


Wilk-Shapiro / Rankit Plot of PCE
320
240
160
80
0
Ordered Data
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Rankits
Approximate Wilk-Shapiro 0.9606   124 cases

**APPENDIX G**
**Water Data Comparison Tables for On-Site Lab Generated Data Versus CLP (Off-Site) Generated Data**

ANALYTICAL RESULTS FOR BENZENE IN GROUNDWATER
(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.5 | MW01-2D | 78-83 | 2 | -1.5 |
| MW02-1D | 66-68 | | 0.5 | MW02-1D | 68-78 | 2 | -1.5 |
| MW04-1S | 13-15 | | 0.5 | MW04-1S | 11.1-21.1 | 2 | -1.5 |
| MW04-3I | 32-34 | | 0.5 | MW04-3I | 26.7-31.7 | 2 | -1.5 |
| MW05-1D | 25-27 | | 0.5 | MW05-1D | 22-27 | 2 | -1.5 |
| MW05-2S | 12-14 | | 0.85 | MW05-2S | 7.5-17.4 | 2 | -1.15 |
| MW05-3D | 81-83 | | 0.5 | MW05-3D | 81.2-85.9 | 2 | -1.5 |
| MW07-1S | 8-10 | | 0.5 | MW07-1S | 6.6-16.6 | 2 | -1.5 |
| MW07-2D | 43-45 | | 0.5 | MW07-2D | 44.7-49.7 | 2 | -1.5 |
| MW07-3I | 25-27 | | 1.6 | MW07-3I | 22.35-27.2 | 2 | -0.4 |
| MW09-1D | 52-53 | | 0.5 | MW09-1D | 50.3-55.2 | 2 | -1.5 |
| MW09-2D | 161-163 | | 0.5 | MW09-2D | 163-168 | 2 | -1.5 |
| MW09-3I | 73-75 | | 0.5 | MW09-3I | 70-75 | 2 | -1.5 |
| MW10-1D | 52-56 | | 0.5 | MW10-2I | 51.5-56.5 | 2 | -1.5 |
| MW10-1D | 130-132 | | 0.56 | MW10-1D | 130.5-135.5 | 2 | -1.44 |
| MW13-1I | 37.8-47.8 | * | 0.5 | MW13-1I | 37.8-47.8 | 2 | -1.5 |
| MW16-1D | 33.2-37.9 | * | 0.5 | MW16-1D | 33.2-37.9 | 2 | -1.5 |
| MW17-1D | 9-10.5 | | 1 | MW17-4S | 7-17 | 2 | -1 |
| MW17-2D | 36-38 | | 0.5 | MW17-3I | 33-38 | 2 | -1.5 |
| MW17-2D | 98-100 | | 0.5 | MW17-2D | 95-99.9 | 2 | -1.5 |
| MW19-1D | 13-15 | | 0.54 | MW19-2S | 10.7-20.6 | 2 | -1.46 |
| MW19-1D | 37-49.2 | | 0.5 | MW19-1D | 37-46.9 | 2 | -1.5 |
| MW20-1D | 10-12 | | 1900 | MW20-2S | 7.8-17.7 | 75 | 1825 |
| MW20-1D | 30.8-35.8 | * | 0.5 | MW20-1D | 30.8-35.5 | 2 | -1.5 |
| MW21-1D | 10-12 | | 4800 | MW21-3S | 8.9-18.9 | 77 | 4723 |
| MW21-2D | 30.2-34.9 | * | 0.5 | MW21-2D | 30.2-34.9 | 2 | -1.5 |
| MW22-1D | 57.9-62.9 | * | 0.5 | MW22-1D | 57.9-62.9 | 2 | -1.5 |
| MW22-2I | 42.7-47.6 | * | 0.5 | MW22-2I | 42.7-47.6 | 2 | -1.5 |
| MW22-3S | 6.6-16.5 | * | 2.2 | MW22-3S | 6.6-16.5 | 3 | -0.8 |
| MW23-1D | 30.2-34.9 | * | 0.5 | MW23-1D | 30.2-34.9 | 2 | -1.5 |
| MW23-2S | 8.25-12.95 | * | 0.5 | MW23-2S | 8.25-12.95 | 2 | -1.5 |
| MW24-1D | 87-91.7 | * | 0.5 | MW24-1D | 87-91.7 | 2 | -1.5 |
| MW24-2S | 11.9-21.6 | * | 0.5 | MW24-2S | 11.9-21.6 | 2 | -1.5 |
| MW25-1D | 55-60 | * | 0.5 | MW25-1D | 55-60 | 2 | -1.5 |
| MW25-2I | 33-38 | * | 380 | MW25-2I | 33-38 | 17 | 363 |
| MW25-3S | 11-21 | * | 2.1 | MW25-3S | 11-21 | 2 | 0.1 |
| MW26-2I | 36.5-41.3 | * | 0.5 | MW26-2I | 36.5-41.3 | 2 | -1.5 |
| MW26-3S | 10-20 | * | 0.95 | MW26-3S | 10-20 | 20 | -19.05 |
| MW27-2D | 19-21 | | 1.1 | MW27-4S | 17.2-26.9 | 2 | -0.9 |
| MW27-2D | 94-96 | | 0.5 | MW27-2D | 93.3-98.2 | 2 | -1.5 |
| MW28-2D | 72.7-77.4 | * | 0.5 | MW28-2D | 72.7-77.4 | 2 | -1.5 |
| MW28-4I | 28-33 | * | 100 | MW28-4I | 28-30 | 44 | 56 |
| MW28-5S | 10-20 | * | 1600 | MW28-5S | 10-20 | 120 | 1480 |
| MW29-1D | 28-32.8 | * | 1.1 | MW29-1D | 28-32.8 | 2 | -0.9 |
| MW29-2S | 10.5-20.4 | * | 3.2 | MW29-2S | 10.5-20.4 | 2 | 1.2 |
| MW30-1I | 33-35 | | 0.5 | MW30-1I | 30.2-34.9 | 2 | -1.5 |
| MW31-1D | 94.3-98.95 | * | 0.5 | MW31-1D | 94.25-98.95 | 2 | -1.5 |
| MW31-2I | 53.9-58.6 | * | 0.5 | MW31-2I | 53.9-58.6 | 2 | -1.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.5 | MW31-3S | 12.9-22.6 | 2 | -1.5 |
| MW33-1D | 29.7-39.6 | * | 0.5 | MW33-1D | 29.7-39.6 | 2 | -1.5 |
| MW33-2S | 10-19.9 | * | 0.5 | MW33-2S | 10-19.9 | 2 | -1.5 |
| MW34-1D | 11-13 | | 4.1 | MW34-2S | 8.5-18.4 | 2 | 2.1 |
| MW34-1D | 35.75-45.6 | * | 0.5 | MW34-1D | 35.75-45.65 | 2 | -1.5 |
| MW35-1D | 35.8-45.7 | * | 0.5 | MW35-1D | 35.8-45.7 | 2 | -1.5 |
| MW35-2S | 23-27.9 | * | 0.5 | MW35-2S | 23-27.9 | 2 | -1.5 |
| MW36-1D | 12-15 | | 1 | MW36-3S | 7.7-17.6 | 2 | -1 |
| MW37-1D | 11-14 | | 0.82 | MW37-3S | 7.3-17.2 | 2 | -1.18 |
| MW37-1D | 53-55 | | 0.5 | MW37-2I | 44.8-54.75 | 2 | -1.5 |
| MW39-1D | 123-125 | | 0.5 | MW39-1D | 119.6-129.5 | 2 | -1.5 |
| PZ06 | 13-16 | | 0.7 | PZ06 | 11.8-21.8 | 2 | -1.3 |
| PZ14 | 11-13 | | 0.53 | PZ14 | 7-17 | 2 | -1.47 |
| PZ15 | 12.1-20 | | 0.5 | PZ15 | 12.1-22 | 2 | -1.5 |
| PZ32 | 9.1-19 | * | 0.5 | PZ32 | 9.1-19 | 2 | -1.5 |
| 04-517-M | 5-15 | * | 0.5 | 04-517-M | 5-15 | 2 | -1.5 |
| 14-552-M | 8.1-18.1 | * | 0.5 | 14-552-M | 8.1-18.1 | 2 | -1.5 |
| 14-553-M | 8-18 | * | 0.5 | 14-553-M | 8.3-18.3 | 2 | -1.5 |
| 14-554-M | 6-16 | * | 0.5 | 14-554-M | 5.9-15.9 | 2 | -1.5 |
| 14-626-M | 65-75 | * | 0.5 | 14-626-M | 65.2-75.2 | 2 | -1.5 |
| 583-M | 13-23 | * | 0.5 | 583-M | 13-23 | 2 | -1.5 |
| 584-M | 15.8-25.8 | * | 0.5 | 584-M | 15.8-25.8 | 2 | -1.5 |
| GR-333 | 25-35 | * | 0.5 | GR-333 | 25.1-35.1 | 2 | -1.5 |
| GR-334 | 150 | * | 0.5 | GR-334 | 145-155 | 2 | -1.5 |

## ANALYTICAL RESULTS FOR TOLUENE IN GROUNDWATER
(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.5 | MW01-2D | 78-83 | 1 | -0.5 |
| MW02-1D | 66-68 | | 0.5 | MW02-1D | 68-78 | 1 | -0.5 |
| MW04-1S | 13-15 | | 0.5 | MW04-1S | 11.1-21.1 | 1 | -0.5 |
| MW04-3I | 32-34 | | 0.5 | MW04-3I | 26.7-31.7 | 1 | -0.5 |
| MW05-1D | 25-27 | | 0.5 | MW05-1D | 22-27 | 1 | -0.5 |
| MW05-2S | 12-14 | | 2.4 | MW05-2S | 7.5-17.4 | 1 | 1.4 |
| MW05-3D | 81-83 | | 0.5 | MW05-3D | 81.2-85.9 | 1 | -0.5 |
| MW07-1S | 8-10 | | 0.5 | MW07-1S | 6.6-16.6 | 1 | -0.5 |
| MW07-2D | 43-45 | | 0.87 | MW07-2D | 44.7-49.7 | 1 | -0.13 |
| MW07-3I | 25-27 | | 3.2 | MW07-3I | 22.35-27.2 | 1 | 2.2 |
| MW09-1D | 52-53 | | 0.5 | MW09-1D | 50.3-55.2 | 1 | -0.5 |
| MW09-2D | 161-163 | | 1.2 | MW09-2D | 163-168 | 1 | 0.2 |
| MW09-3I | 73-75 | | 0.58 | MW09-3I | 70-75 | 1 | -0.42 |
| MW10-1D | 52-56 | | 0.5 | MW10-2I | 51.5-56.5 | 1 | -0.5 |
| MW10-1D | 130-132 | | 1.8 | MW10-1D | 130.5-135.5 | 1 | 0.8 |
| MW13-1I | 37.8-47.8 | * | 0.5 | MW13-1I | 37.8-47.8 | 1 | -0.5 |
| MW16-1D | 33.2-37.9 | * | 0.5 | MW16-1D | 33.2-37.9 | 1 | -0.5 |
| MW17-1D | 9-10.5 | | 1.5 | MW17-4S | 7-17 | 1 | 0.5 |
| MW17-2D | 36-38 | | 0.5 | MW17-3I | 33-38 | 1 | -0.5 |
| MW17-2D | 98-100 | | 0.5 | MW17-2D | 95-99.9 | 1 | -0.5 |
| MW19-1D | 13-15 | | 1.5 | MW19-2S | 10.7-20.6 | 1 | 0.5 |
| MW19-1D | 37-49.2 | | 0.5 | MW19-1D | 37-46.9 | 1 | -0.5 |
| MW20-1D | 10-12 | | 860 | MW20-2S | 7.8-17.7 | 1 | 859 |
| MW20-1D | 30.8-35.8 | * | 0.5 | MW20-1D | 30.8-35.5 | 1 | -0.5 |
| MW21-1D | 10-12 | | 3300 | MW21-3S | 8.9-18.9 | 54 | 3246 |
| MW21-2D | 30.2-34.9 | * | 0.5 | MW21-2D | 30.2-34.9 | 1 | -0.5 |
| MW22-1D | 57.9-62.9 | * | 0.5 | MW22-1D | 57.9-62.9 | 1 | -0.5 |
| MW22-2I | 42.7-47.6 | * | 0.5 | MW22-2I | 42.7-47.6 | 1 | -0.5 |
| MW22-3S | 6.6-16.5 | * | 0.5 | MW22-3S | 6.6-16.5 | 1 | -0.5 |
| MW23-1D | 30.2-34.9 | * | 0.5 | MW23-1D | 30.2-34.9 | 1 | -0.5 |
| MW23-2S | 8.25-12.95 | * | 25 | MW23-2S | 8.25-12.95 | 1 | 24 |
| MW24-1D | 87-91.7 | * | 0.5 | MW24-1D | 87-91.7 | 1 | -0.5 |
| MW24-2S | 11.9-21.6 | * | 0.5 | MW24-2S | 11.9-21.6 | 1 | -0.5 |
| MW25-1D | 55-60 | * | 0.5 | MW25-1D | 55-60 | 1 | -0.5 |
| MW25-2I | 33-38 | * | 10 | MW25-2I | 33-38 | 2 | 8 |
| MW25-3S | 11-21 | * | 1.5 | MW25-3S | 11-21 | 1 | 0.5 |
| MW26-2I | 36.5-41.3 | * | 0.5 | MW26-2I | 36.5-41.3 | 1 | -0.5 |
| MW26-3S | 10-20 | * | 27 | MW26-3S | 10-20 | 10 | 17 |
| MW27-2D | 19-21 | | 2.4 | MW27-4S | 17.2-26.9 | 1 | 1.4 |
| MW27-2D | 94-96 | | 0.5 | MW27-2D | 93.3-98.2 | 1 | -0.5 |
| MW28-2D | 72.7-77.4 | * | 0.5 | MW28-2D | 72.7-77.4 | 1 | -0.5 |
| MW28-4I | 28-33 | * | 0.5 | MW28-4I | 28-30 | 1 | -0.5 |
| MW28-5S | 10-20 | * | 13 | MW28-5S | 10-20 | 1 | 12 |
| MW29-1D | 28-32.8 | * | 0.5 | MW29-1D | 28-32.8 | 1 | -0.5 |
| MW29-2S | 10.5-20.4 | * | 16 | MW29-2S | 10.5-20.4 | 1 | 15 |
| MW30-1I | 33-35 | | 0.5 | MW30-1I | 30.2-34.9 | 1 | -0.5 |
| MW31-1D | 94.3-98.95 | * | 0.5 | MW31-1D | 94.25-98.95 | 1 | -0.5 |
| MW31-2I | 53.9-58.6 | * | 0.5 | MW31-2I | 53.9-58.6 | 1 | -0.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.5 | MW31-3S | 12.9-22.6 | 1 | -0.5 |
| MW33-1D | 29.7-39.6 | * | 0.5 | MW33-1D | 29.7-39.6 | 1 | -0.5 |
| MW33-2S | 10-19.9 | * | 0.5 | MW33-2S | 10-19.9 | 1 | -0.5 |
| MW34-1D | 11-13 | | 5.5 | MW34-2S | 8.5-18.4 | 1 | 4.5 |
| MW34-1D | 35.75-45.6 | * | 0.5 | MW34-1D | 35.75-45.65 | 1 | -0.5 |
| MW35-1D | 35.8-45.7 | * | 0.5 | MW35-1D | 35.8-45.7 | 1 | -0.5 |
| MW35-2S | 23-27.9 | * | 0.5 | MW35-2S | 23-27.9 | 1 | -0.5 |
| MW36-1D | 12-15 | | 1.9 | MW36-3S | 7.7-17.6 | 1 | 0.9 |
| MW37-1D | 11-14 | | 1.3 | MW37-3S | 7.3-17.2 | 1 | 0.3 |
| MW37-1D | 53-55 | | 0.5 | MW37-2I | 44.8-54.75 | 1 | -0.5 |
| MW39-1D | 123-125 | | 0.5 | MW39-1D | 119.6-129.5 | 1 | -0.5 |
| PZ06 | 13-16 | | 1.1 | PZ06 | 11.8-21.8 | 1 | 0.1 |
| PZ14 | 11-13 | | 0.5 | PZ14 | 7-17 | 1 | -0.5 |
| PZ15 | 12.1-20 | | 0.5 | PZ15 | 12.1-22 | 1 | -0.5 |
| PZ32 | 9.1-19 | * | 0.5 | PZ32 | 9.1-19 | 1 | -0.5 |
| 04-517-M | 5-15 | * | 0.5 | 04-517-M | 5-15 | 1 | -0.5 |
| 14-552-M | 8.1-18.1 | * | 0.5 | 14-552-M | 8.1-18.1 | 1 | -0.5 |
| 14-553-M | 8-18 | * | 0.5 | 14-553-M | 8.3-18.3 | 1 | -0.5 |
| 14-554-M | 6-16 | * | 0.5 | 14-554-M | 5.9-15.9 | 1 | -0.5 |
| 14-626-M | 65-75 | * | 0.5 | 14-626-M | 65.2-75.2 | 1 | -0.5 |
| 583-M | 13-23 | * | 0.5 | 583-M | 13-23 | 1 | -0.5 |
| 584-M | 15.8-25.8 | * | 0.5 | 584-M | 15.8-25.8 | 1 | -0.5 |
| GR-333 | 25-35 | * | 0.5 | GR-333 | 25.1-35.1 | 1 | -0.5 |
| GR-334 | 150 | * | 0.5 | GR-334 | 145-155 | 1 | -0.5 |

## ANALYTICAL RESULTS FOR ETHYLBENZENE IN GROUNDWATER

(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.5 | MW01-2D | 78-83 | 1 | -0.5 |
| MW02-1D | 66-68 | | 0.5 | MW02-1D | 68-78 | 1 | -0.5 |
| MW04-1S | 13-15 | | 0.5 | MW04-1S | 11.1-21.1 | 1 | -0.5 |
| MW04-3I | 32-34 | | 0.5 | MW04-3I | 26.7-31.7 | 1 | -0.5 |
| MW05-1D | 25-27 | | 0.5 | MW05-1D | 22-27 | 1 | -0.5 |
| MW05-2S | 12-14 | | 0.5 | MW05-2S | 7.5-17.4 | 1 | -0.5 |
| MW05-3D | 81-83 | | 0.5 | MW05-3D | 81.2-85.9 | 1 | -0.5 |
| MW07-1S | 8-10 | | 0.5 | MW07-1S | 6.6-16.6 | 1 | -0.5 |
| MW07-2D | 43-45 | | 0.5 | MW07-2D | 44.7-49.7 | 1 | -0.5 |
| MW07-3I | 25-27 | | 0.5 | MW07-3I | 22.35-27.2 | 1 | -0.5 |
| MW09-1D | 52-53 | | 0.5 | MW09-1D | 50.3-55.2 | 1 | -0.5 |
| MW09-2D | 161-163 | | 0.5 | MW09-2D | 163-168 | 1 | -0.5 |
| MW09-3I | 73-75 | | 0.5 | MW09-3I | 70-75 | 1 | -0.5 |
| MW10-1D | 52-56 | | 0.5 | MW10-2I | 51.5-56.5 | 1 | -0.5 |
| MW10-1D | 130-132 | | 0.5 | MW10-1D | 130.5-135.5 | 1 | -0.5 |
| MW13-1I | 37.8-47.8 | * | 0.5 | MW13-1I | 37.8-47.8 | 1 | -0.5 |
| MW16-1D | 33.2-37.9 | * | 0.5 | MW16-1D | 33.2-37.9 | 1 | -0.5 |
| MW17-1D | 9-10.5 | | 0.66 | MW17-4S | 7-17 | 1 | -0.34 |
| MW17-2D | 36-38 | | 0.5 | MW17-3I | 33-38 | 1 | -0.5 |
| MW17-2D | 98-100 | | 0.5 | MW17-2D | 95-99.9 | 1 | -0.5 |
| MW19-1D | 13-15 | | 0.5 | MW19-2S | 10.7-20.6 | 1 | -0.5 |
| MW19-1D | 37-49.2 | | 0.5 | MW19-1D | 37-46.9 | 1 | -0.5 |
| MW20-1D | 10-12 | | 2600 | MW20-2S | 7.8-17.7 | 70 | 2530 |
| MW20-1D | 30.8-35.8 | * | 0.5 | MW20-1D | 30.8-35.5 | 1 | -0.5 |
| MW21-1D | 10-12 | | 500 | MW21-3S | 8.9-18.9 | 82 | 418 |
| MW21-2D | 30.2-34.9 | * | 0.5 | MW21-2D | 30.2-34.9 | 1 | -0.5 |
| MW22-1D | 57.9-62.9 | * | 0.5 | MW22-1D | 57.9-62.9 | 1 | -0.5 |
| MW22-2I | 42.7-47.6 | * | 0.5 | MW22-2I | 42.7-47.6 | 1 | -0.5 |
| MW22-3S | 6.6-16.5 | * | 0.5 | MW22-3S | 6.6-16.5 | 1 | -0.5 |
| MW23-1D | 30.2-34.9 | * | 0.5 | MW23-1D | 30.2-34.9 | 1 | -0.5 |
| MW23-2S | 8.25-12.95 | * | 0.5 | MW23-2S | 8.25-12.95 | 1 | -0.5 |
| MW24-1D | 87-91.7 | * | 0.5 | MW24-1D | 87-91.7 | 1 | -0.5 |
| MW24-2S | 11.9-21.6 | * | 0.5 | MW24-2S | 11.9-21.6 | 1 | -0.5 |
| MW25-1D | 55-60 | * | 0.5 | MW25-1D | 55-60 | 1 | -0.5 |
| MW25-2I | 33-38 | * | 0.5 | MW25-2I | 33-38 | 2 | -1.5 |
| MW25-3S | 11-21 | * | 0.5 | MW25-3S | 11-21 | 1 | -0.5 |
| MW26-2I | 36.5-41.3 | * | 0.5 | MW26-2I | 36.5-41.3 | 1 | -0.5 |
| MW26-3S | 10-20 | * | 62 | MW26-3S | 10-20 | 10 | 52 |
| MW27-2D | 19-21 | | 0.5 | MW27-4S | 17.2-26.9 | 1 | -0.5 |
| MW27-2D | 94-96 | | 0.5 | MW27-2D | 93.3-98.2 | 1 | -0.5 |
| MW28-2D | 72.7-77.4 | * | 0.5 | MW28-2D | 72.7-77.4 | 1 | -0.5 |
| MW28-4I | 28-33 | * | 0.5 | MW28-4I | 28-30 | 1 | -0.5 |
| MW28-5S | 10-20 | * | 3.7 | MW28-5S | 10-20 | 1 | 2.7 |
| MW29-1D | 28-32.8 | * | 0.5 | MW29-1D | 28-32.8 | 1 | -0.5 |
| MW29-2S | 10.5-20.4 | * | 20 | MW29-2S | 10.5-20.4 | 1 | 19 |
| MW30-1I | 33-35 | | 0.5 | MW30-1I | 30.2-34.9 | 1 | -0.5 |
| MW31-1D | 94.3-98.95 | * | 0.5 | MW31-1D | 94.25-98.95 | 1 | -0.5 |
| MW31-2I | 53.9-58.6 | * | 0.5 | MW31-2I | 53.9-58.6 | 1 | -0.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.5 | MW31-3S | 12.9-22.6 | 1 | -0.5 |
| MW33-1D | 29.7-39.6 | * | 0.5 | MW33-1D | 29.7-39.6 | 1 | -0.5 |
| MW33-2S | 10-19.9 | * | 0.5 | MW33-2S | 10-19.9 | 1 | -0.5 |
| MW34-1D | 11-13 | | 1.4 | MW34-2S | 8.5-18.4 | 1 | 0.4 |
| MW34-1D | 35.75-45.6 | * | 0.5 | MW34-1D | 35.75-45.65 | 1 | -0.5 |
| MW35-1D | 35.8-45.7 | * | 0.5 | MW35-1D | 35.8-45.7 | 1 | -0.5 |
| MW35-2S | 23-27.9 | * | 0.5 | MW35-2S | 23-27.9 | 1 | -0.5 |
| MW36-1D | 12-15 | | 1.1 | MW36-3S | 7.7-17.6 | 1 | 0.1 |
| MW37-1D | 11-14 | | 0.5 | MW37-3S | 7.3-17.2 | 1 | -0.5 |
| MW37-1D | 53-55 | | 0.5 | MW37-2I | 44.8-54.75 | 1 | -0.5 |
| MW39-1D | 123-125 | | 0.5 | MW39-1D | 119.6-129.5 | 1 | -0.5 |
| PZ06 | 13-16 | | 0.5 | PZ06 | 11.8-21.8 | 1 | -0.5 |
| PZ14 | 11-13 | | 0.5 | PZ14 | 7-17 | 1 | -0.5 |
| PZ15 | 12.1-20 | | 0.5 | PZ15 | 12.1-22 | 1 | -0.5 |
| PZ32 | 9.1-19 | * | 0.5 | PZ32 | 9.1-19 | 1 | -0.5 |
| 04-517-M | 5-15 | * | 0.5 | 04-517-M | 5-15 | 1 | -0.5 |
| 14-552-M | 8.1-18.1 | * | 0.5 | 14-552-M | 8.1-18.1 | 1 | -0.5 |
| 14-553-M | 8-18 | * | 0.5 | 14-553-M | 8.3-18.3 | 1 | -0.5 |
| 14-554-M | 6-16 | * | 0.5 | 14-554-M | 5.9-15.9 | 1 | -0.5 |
| 14-626-M | 65-75 | * | 0.5 | 14-626-M | 65.2-75.2 | 1 | -0.5 |
| 583-M | 13-23 | * | 0.5 | 583-M | 13-23 | 1 | -0.5 |
| 584-M | 15.8-25.8 | * | 0.5 | 584-M | 15.8-25.8 | 1 | -0.5 |
| GR-333 | 25-35 | * | 0.5 | GR-333 | 25.1-35.1 | 1 | -0.5 |
| GR-334 | 150 | * | 0.5 | GR-334 | 145-155 | 1 | -0.5 |

## ANALYTICAL RESULTS FOR XYLENE IN GROUNDWATER
(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.5 | MW01-2D | 78-83 | 1 | -0.5 |
| MW02-1D | 66-68 | | 0.5 | MW02-1D | 68-78 | 1 | -0.5 |
| MW04-1S | 13-15 | | 0.5 | MW04-1S | 11.1-21.1 | 1 | -0.5 |
| MW04-3I | 32-34 | | 0.5 | MW04-3I | 26.7-31.7 | 1 | -0.5 |
| MW05-1D | 25-27 | | 0.5 | MW05-1D | 22-27 | 1 | -0.5 |
| MW05-2S | 12-14 | | 1.6 | MW05-2S | 7.5-17.4 | 1 | 0.6 |
| MW05-3D | 81-83 | | 0.5 | MW05-3D | 81.2-85.9 | 1 | -0.5 |
| MW07-1S | 8-10 | | 0.5 | MW07-1S | 6.6-16.6 | 1 | -0.5 |
| MW07-2D | 43-45 | | 0.91 | MW07-2D | 44.7-49.7 | 1 | -0.09 |
| MW07-3I | 25-27 | | 1 | MW07-3I | 22.35-27.2 | 1 | 0 |
| MW09-1D | 52-53 | | 0.5 | MW09-1D | 50.3-55.2 | 1 | -0.5 |
| MW09-2D | 161-163 | | 1.4 | MW09-2D | 163-168 | 1 | 0.4 |
| MW09-3I | 73-75 | | 0.5 | MW09-3I | 70-75 | 1 | -0.5 |
| MW10-1D | 52-56 | | 0.5 | MW10-2I | 51.5-56.5 | 1 | -0.5 |
| MW10-1D | 130-132 | | 0.5 | MW10-1D | 130.5-135.5 | 1 | -0.5 |
| MW13-1I | 37.8-47.8 | * | 0.5 | MW13-1I | 37.8-47.8 | 1 | -0.5 |
| MW16-1D | 33.2-37.9 | * | 0.5 | MW16-1D | 33.2-37.9 | 1 | -0.5 |
| MW17-1D | 9-10.5 | | 0.46 | MW17-4S | 7-17 | 1 | -0.54 |
| MW17-2D | 36-38 | | 0.5 | MW17-3I | 33-38 | 1 | -0.5 |
| MW17-2D | 98-100 | | 0.5 | MW17-2D | 95-99.9 | 1 | -0.5 |
| MW19-1D | 13-15 | | 0.6 | MW19-2S | 10.7-20.6 | 1 | -0.4 |
| MW19-1D | 37-49.2 | | 0.5 | MW19-1D | 37-46.9 | 1 | -0.5 |
| MW20-1D | 10-12 | | 1200 | MW20-2S | 7.8-17.7 | 75 | 1125 |
| MW20-1D | 30.8-35.8 | * | 0.5 | MW20-1D | 30.8-35.5 | 1 | -0.5 |
| MW21-1D | 10-12 | | 1000 | MW21-3S | 8.9-18.9 | 150 | 850 |
| MW21-2D | 30.2-34.9 | * | 0.5 | MW21-2D | 30.2-34.9 | 1 | -0.5 |
| MW22-1D | 57.9-62.9 | * | 0.5 | MW22-1D | 57.9-62.9 | 1 | -0.5 |
| MW22-2I | 42.7-47.6 | * | 0.5 | MW22-2I | 42.7-47.6 | 1 | -0.5 |
| MW22-3S | 6.6-16.5 | * | 0.5 | MW22-3S | 6.6-16.5 | 1 | -0.5 |
| MW23-1D | 30.2-34.9 | * | 0.5 | MW23-1D | 30.2-34.9 | 1 | -0.5 |
| MW23-2S | 8.25-12.95 | * | 0.5 | MW23-2S | 8.25-12.95 | 1 | -0.5 |
| MW24-1D | 87-91.7 | * | 0.5 | MW24-1D | 87-91.7 | 1 | -0.5 |
| MW24-2S | 11.9-21.6 | * | 0.5 | MW24-2S | 11.9-21.6 | 1 | -0.5 |
| MW25-1D | 55-60 | * | 0.5 | MW25-1D | 55-60 | 1 | -0.5 |
| MW25-2I | 33-38 | * | 0.5 | MW25-2I | 33-38 | 2 | -1.5 |
| MW25-3S | 11-21 | * | 2.9 | MW25-3S | 11-21 | 1 | 1.9 |
| MW26-2I | 36.5-41.3 | * | 0.5 | MW26-2I | 36.5-41.3 | 1 | -0.5 |
| MW26-3S | 10-20 | * | 35 | MW26-3S | 10-20 | 10 | 25 |
| MW27-2D | 19-21 | | 1.5 | MW27-4S | 17.2-26.9 | 1 | 0.5 |
| MW27-2D | 94-96 | | 0.5 | MW27-2D | 93.3-98.2 | 1 | -0.5 |
| MW28-2D | 72.7-77.4 | * | 0.5 | MW28-2D | 72.7-77.4 | 1 | -0.5 |
| MW28-4I | 28-33 | * | 0.5 | MW28-4I | 28-30 | 1 | -0.5 |
| MW28-5S | 10-20 | * | 8.5 | MW28-5S | 10-20 | 1 | 7.5 |
| MW29-1D | 28-32.8 | * | 0.5 | MW29-1D | 28-32.8 | 1 | -0.5 |
| MW29-2S | 10.5-20.4 | * | 19 | MW29-2S | 10.5-20.4 | 1 | 18 |
| MW30-1I | 33-35 | | 0.5 | MW30-1I | 30.2-34.9 | 1 | -0.5 |
| MW31-1D | 94.3-98.95 | * | 0.5 | MW31-1D | 94.25-98.95 | 1 | -0.5 |
| MW31-2I | 53.9-58.6 | * | 0.5 | MW31-2I | 53.9-58.6 | 1 | -0.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.5 | MW31-3S | 12.9-22.6 | 1 | -0.5 |
| MW33-1D | 29.7-39.6 | * | 0.5 | MW33-1D | 29.7-39.6 | 1 | -0.5 |
| MW33-2S | 10-19.9 | * | 0.5 | MW33-2S | 10-19.9 | 1 | -0.5 |
| MW34-1D | 11-13 | | 1.4 | MW34-2S | 8.5-18.4 | 1 | 0.4 |
| MW34-1D | 35.75-45.6 | * | 0.5 | MW34-1D | 35.75-45.65 | 1 | -0.5 |
| MW35-1D | 35.8-45.7 | * | 0.5 | MW35-1D | 35.8-45.7 | 1 | -0.5 |
| MW35-2S | 23-27.9 | * | 0.5 | MW35-2S | 23-27.9 | 1 | -0.5 |
| MW36-1D | 12-15 | | 1.1 | MW36-3S | 7.7-17.6 | 1 | 0.1 |
| MW37-1D | 11-14 | | 0.5 | MW37-3S | 7.3-17.2 | 1 | -0.5 |
| MW37-1D | 53-55 | | 0.5 | MW37-2I | 44.8-54.75 | 1 | -0.5 |
| MW39-1D | 123-125 | | 0.5 | MW39-1D | 119.6-129.5 | 1 | -0.5 |
| PZ06 | 13-16 | | 0.5 | PZ06 | 11.8-21.8 | 1 | -0.5 |
| PZ14 | 11-13 | | 0.5 | PZ14 | 7-17 | 1 | -0.5 |
| PZ15 | 12.1-20 | | 0.5 | PZ15 | 12.1-22 | 1 | -0.5 |
| PZ32 | 9.1-19 | * | 0.5 | PZ32 | 9.1-19 | 1 | -0.5 |
| 04-517-M | 5-15 | * | 0.5 | 04-517-M | 5-15 | 1 | -0.5 |
| 14-552-M | 8.1-18.1 | * | 0.5 | 14-552-M | 8.1-18.1 | 1 | -0.5 |
| 14-553-M | 8-18 | * | 0.5 | 14-553-M | 8.3-18.3 | 1 | -0.5 |
| 14-554-M | 6-16 | * | 0.5 | 14-554-M | 5.9-15.9 | 1 | -0.5 |
| 14-626-M | 65-75 | * | 0.5 | 14-626-M | 65.2-75.2 | 1 | -0.5 |
| 583-M | 13-23 | * | 0.5 | 583-M | 13-23 | 1 | -0.5 |
| 584-M | 15.8-25.8 | * | 0.5 | 584-M | 15.8-25.8 | 1 | -0.5 |
| GR-333 | 25-35 | * | 0.5 | GR-333 | 25.1-35.1 | 1 | -0.5 |
| GR-334 | 150 | * | 0.5 | GR-334 | 145-155 | 1 | -0.5 |

ANALYTICAL RESULTS FOR CHLOROFORM IN GROUNDWATER
(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.3 | MW01-2D | 78-83 | 2 | -1.7 |
| MW02-1D | 66-68 | | 2.4 | MW02-1D | 68-78 | 2 | 0.4 |
| MW04-1S | 13-15 | | 0.2 | MW04-1S | 11.1-21.1 | 2 | -1.8 |
| MW04-3I | 32-34 | | 0.2 | MW04-3I | 26.7-31.7 | 2 | -1.8 |
| MW05-1D | 25-27 | | 1.2 | MW05-1D | 22-27 | 2 | -0.8 |
| MW05-2S | 12-14 | | 0.2 | MW05-2S | 7.5-17.4 | 2 | -1.8 |
| MW05-3D | 81-83 | | 0.2 | MW05-3D | 81.2-85.9 | 2 | -1.8 |
| MW07-1S | 8-10 | | 0.2 | MW07-1S | 6.6-16.6 | 1 | -0.8 |
| MW07-2D | 43-45 | | 0.2 | MW07-2D | 44.7-49.7 | 2 | -1.8 |
| MW07-3I | 25-27 | | 0.96 | MW07-3I | 22.35-27.2 | 0.6 | 0.36 |
| MW09-1D | 52-53 | | 0.2 | MW09-1D | 50.3-55.2 | 2 | -1.8 |
| MW09-2D | 161-163 | | 0.2 | MW09-2D | 163-168 | 2 | -1.8 |
| MW09-3I | 73-75 | | 0.2 | MW09-3I | 70-75 | 2 | -1.8 |
| MW10-1D | 52-56 | | 0.23 | MW10-2I | 51.5-56.5 | 2 | -1.77 |
| MW10-1D | 130-132 | | 0.37 | MW10-1D | 130.5-135.5 | 2 | -1.63 |
| MW13-1I | 37.8-47.8 | * | 0.2 | MW13-1I | 37.8-47.8 | 2 | -1.8 |
| MW16-1D | 33.2-37.9 | * | 0.2 | MW16-1D | 33.2-37.9 | 2 | -1.8 |
| MW17-1D | 9-10.5 | | 0.19 | MW17-4S | 7-17 | 2 | -1.81 |
| MW17-2D | 36-38 | | 0.64 | MW17-3I | 33-38 | 0.6 | 0.04 |
| MW17-2D | 98-100 | | 0.2 | MW17-2D | 95-99.9 | 2 | -1.8 |
| MW19-1D | 13-15 | | 0.2 | MW19-2S | 10.7-20.6 | 2 | -1.8 |
| MW19-1D | 37-49.2 | | 0.2 | MW19-1D | 37-46.9 | 2 | -1.8 |
| MW20-1D | 10-12 | | 0.2 | MW20-2S | 7.8-17.7 | 2 | -1.8 |
| MW20-1D | 30.8-35.8 | * | 0.21 | MW20-1D | 30.8-35.5 | 2 | -1.79 |
| MW21-1D | 10-12 | | 0.2 | MW21-3S | 8.9-18.9 | 2 | -1.8 |
| MW21-2D | 30.2-34.9 | * | 0.2 | MW21-2D | 30.2-34.9 | 2 | -1.8 |
| MW22-1D | 57.9-62.9 | * | 0.2 | MW22-1D | 57.9-62.9 | 2 | -1.8 |
| MW22-2I | 42.7-47.6 | * | 0.2 | MW22-2I | 42.7-47.6 | 2 | -1.8 |
| MW22-3S | 6.6-16.5 | * | 0.2 | MW22-3S | 6.6-16.5 | 2 | -1.8 |
| MW23-1D | 30.2-34.9 | * | 0.2 | MW23-1D | 30.2-34.9 | 2 | -1.8 |
| MW23-2S | 8.25-12.95 | * | 0.2 | MW23-2S | 8.25-12.95 | 2 | -1.8 |
| MW24-1D | 87-91.7 | * | 0.2 | MW24-1D | 87-91.7 | 2 | -1.8 |
| MW24-2S | 11.9-21.6 | * | 0.2 | MW24-2S | 11.9-21.6 | 2 | -1.8 |
| MW25-1D | 55-60 | * | 0.2 | MW25-1D | 55-60 | 2 | -1.8 |
| MW25-2I | 33-38 | * | 0.2 | MW25-2I | 33-38 | 4 | -3.8 |
| MW25-3S | 11-21 | * | 0.2 | MW25-3S | 11-21 | 2 | -1.8 |
| MW26-2I | 36.5-41.3 | * | 0.2 | MW26-2I | 36.5-41.3 | 2 | -1.8 |
| MW26-3S | 10-20 | * | 0.2 | MW26-3S | 10-20 | 20 | -19.8 |
| MW27-2D | 19-21 | | 0.2 | MW27-4S | 17.2-26.9 | 2 | -1.8 |
| MW27-2D | 94-96 | | 0.2 | MW27-2D | 93.3-98.2 | 2 | -1.8 |
| MW28-2D | 72.7-77.4 | * | 0.2 | MW28-2D | 72.7-77.4 | 2 | -1.8 |
| MW28-4I | 28-33 | * | 0.47 | MW28-4I | 28-30 | 2 | -1.53 |
| MW28-5S | 10-20 | * | 0.2 | MW28-5S | 10-20 | 2 | -1.8 |
| MW29-1D | 28-32.8 | * | 0.2 | MW29-1D | 28-32.8 | 2 | -1.8 |
| MW29-2S | 10.5-20.4 | * | 0.2 | MW29-2S | 10.5-20.4 | 2 | -1.8 |
| MW30-1I | 33-35 | | 0.2 | MW30-1I | 30.2-34.9 | 2 | -1.8 |
| MW31-1D | 94.3-98.95 | * | 0.2 | MW31-1D | 94.25-98.95 | 2 | -1.8 |
| MW31-2I | 53.9-58.6 | * | 0.2 | MW31-2I | 53.9-58.6 | 2 | -1.8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.2 | MW31-3S | 12.9-22.6 | 2 | -1.8 |
| MW33-1D | 29.7-39.6 | * | 0.2 | MW33-1D | 29.7-39.6 | 2 | -1.8 |
| MW33-2S | 10-19.9 | * | 0.2 | MW33-2S | 10-19.9 | 2 | -1.8 |
| MW34-1D | 11-13 | | 0.2 | MW34-2S | 8.5-18.4 | 2 | -1.8 |
| MW34-1D | 35.75-45.6 | * | 0.2 | MW34-1D | 35.75-45.65 | 2 | -1.8 |
| MW35-1D | 35.8-45.7 | * | 0.2 | MW35-1D | 35.8-45.7 | 2 | -1.8 |
| MW35-2S | 23-27.9 | * | 0.2 | MW35-2S | 23-27.9 | 2 | -1.8 |
| MW36-1D | 12-15 | | 0.2 | MW36-3S | 7.7-17.6 | 2 | -1.8 |
| MW37-1D | 11-14 | | 0.2 | MW37-3S | 7.3-17.2 | 2 | -1.8 |
| MW37-1D | 53-55 | | 0.2 | MW37-2I | 44.8-54.75 | 2 | -1.8 |
| MW39-1D | 123-125 | | 0.2 | MW39-1D | 119.6-129.5 | 2 | -1.8 |
| PZ06 | 13-16 | | 0.7 | PZ06 | 11.8-21.8 | 2 | -1.3 |
| PZ14 | 11-13 | | 1.1 | PZ14 | 7-17 | 2 | -0.9 |
| PZ15 | 12.1-20 | | 0.2 | PZ15 | 12.1-22 | 2 | -1.8 |
| PZ32 | 9.1-19 | * | 0.53 | PZ32 | 9.1-19 | 0.7 | -0.17 |
| 04-517-M | 5-15 | * | 0.47 | 04-517-M | 5-15 | 2 | -1.53 |
| 14-552-M | 8.1-18.1 | * | 0.2 | 14-552-M | 8.1-18.1 | 2 | -1.8 |
| 14-553-M | 8-18 | * | 0.2 | 14-553-M | 8.3-18.3 | 2 | -1.8 |
| 14-554-M | 6-16 | * | 0.17 | 14-554-M | 5.9-15.9 | 2 | -1.83 |
| 14-626-M | 65-75 | * | 0.2 | 14-626-M | 65.2-75.2 | 2 | -1.8 |
| 583-M | 13-23 | * | 0.2 | 583-M | 13-23 | 2 | -1.8 |
| 584-M | 15.8-25.8 | * | 0.2 | 584-M | 15.8-25.8 | 2 | -1.8 |
| GR-333 | 25-35 | * | 0.75 | GR-333 | 25.1-35.1 | 0.6 | 0.15 |
| GR-334 | 150 | * | 0.2 | GR-334 | 145-155 | 2 | -1.8 |

ANALYTICAL RESULTS FOR 1,1,1-TCA IN GROUNDWATER
(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.2 | MW01-2D | 78-83 | 2 | -1.8 |
| MW02-1D | 66-68 | | 0.2 | MW02-1D | 68-78 | 2 | -1.8 |
| MW04-1S | 13-15 | | 1.29 | MW04-1S | 11.1-21.1 | 0.7 | 0.59 |
| MW04-3I | 32-34 | | 0.2 | MW04-3I | 26.7-31.7 | 2 | -1.8 |
| MW05-1D | 25-27 | | 0.2 | MW05-1D | 22-27 | 2 | -1.8 |
| MW05-2S | 12-14 | | 0.2 | MW05-2S | 7.5-17.4 | 2 | -1.8 |
| MW05-3D | 81-83 | | 0.2 | MW05-3D | 81.2-85.9 | 2 | -1.8 |
| MW07-1S | 8-10 | | 0.2 | MW07-1S | 6.6-16.6 | 0.6 | -0.4 |
| MW07-2D | 43-45 | | 0.2 | MW07-2D | 44.7-49.7 | 2 | -1.8 |
| MW07-3I | 25-27 | | 0.55 | MW07-3I | 22.35-27.2 | 2 | -1.45 |
| MW09-1D | 52-53 | | 0.2 | MW09-1D | 50.3-55.2 | 2 | -1.8 |
| MW09-2D | 161-163 | | 0.2 | MW09-2D | 163-168 | 2 | -1.8 |
| MW09-3I | 73-75 | | 0.2 | MW09-3I | 70-75 | 2 | -1.8 |
| MW10-1D | 52-56 | | 0.2 | MW10-2I | 51.5-56.5 | 2 | -1.8 |
| MW10-1D | 130-132 | | 0.2 | MW10-1D | 130.5-135.5 | 2 | -1.8 |
| MW13-1I | 37.8-47.8 | * | 0.2 | MW13-1I | 37.8-47.8 | 2 | -1.8 |
| MW16-1D | 33.2-37.9 | * | 0.2 | MW16-1D | 33.2-37.9 | 2 | -1.8 |
| MW17-1D | 9-10.5 | | 0.27 | MW17-4S | 7-17 | 2 | -1.73 |
| MW17-2D | 36-38 | | 0.43 | MW17-3I | 33-38 | 2 | -1.57 |
| MW17-2D | 98-100 | | 0.2 | MW17-2D | 95-99.9 | 2 | -1.8 |
| MW19-1D | 13-15 | | 0.2 | MW19-2S | 10.7-20.6 | 2 | -1.8 |
| MW19-1D | 37-49.2 | | 0.2 | MW19-1D | 37-46.9 | 2 | -1.8 |
| MW20-1D | 10-12 | | 0.28 | MW20-2S | 7.8-17.7 | 2 | -1.72 |
| MW20-1D | 30.8-35.8 | * | 0.37 | MW20-1D | 30.8-35.5 | 2 | -1.63 |
| MW21-1D | 10-12 | | 0.2 | MW21-3S | 8.9-18.9 | 2 | -1.8 |
| MW21-2D | 30.2-34.9 | * | 0.41 | MW21-2D | 30.2-34.9 | 2 | -1.59 |
| MW22-1D | 57.9-62.9 | * | 0.2 | MW22-1D | 57.9-62.9 | 2 | -1.8 |
| MW22-2I | 42.7-47.6 | * | 0.2 | MW22-2I | 42.7-47.6 | 2 | -1.8 |
| MW22-3S | 6.6-16.5 | * | 0.2 | MW22-3S | 6.6-16.5 | 2 | -1.8 |
| MW23-1D | 30.2-34.9 | * | 0.23 | MW23-1D | 30.2-34.9 | 2 | -1.77 |
| MW23-2S | 8.25-12.95 | * | 0.2 | MW23-2S | 8.25-12.95 | 2 | -1.8 |
| MW24-1D | 87-91.7 | * | 0.2 | MW24-1D | 87-91.7 | 2 | -1.8 |
| MW24-2S | 11.9-21.6 | * | 0.2 | MW24-2S | 11.9-21.6 | 2 | -1.8 |
| MW25-1D | 55-60 | * | 0.2 | MW25-1D | 55-60 | 2 | -1.8 |
| MW25-2I | 33-38 | * | 0.2 | MW25-2I | 33-38 | 4 | -3.8 |
| MW25-3S | 11-21 | * | 0.2 | MW25-3S | 11-21 | 2 | -1.8 |
| MW26-2I | 36.5-41.3 | * | 0.2 | MW26-2I | 36.5-41.3 | 2 | -1.8 |
| MW26-3S | 10-20 | * | 0.2 | MW26-3S | 10-20 | 20 | -19.8 |
| MW27-2D | 19-21 | | 0.16 | MW27-4S | 17.2-26.9 | 2 | -1.84 |
| MW27-2D | 94-96 | | 0.2 | MW27-2D | 93.3-98.2 | 2 | -1.8 |
| MW28-2D | 72.7-77.4 | * | 0.2 | MW28-2D | 72.7-77.4 | 2 | -1.8 |
| MW28-4I | 28-33 | * | 0.2 | MW28-4I | 28-30 | 2 | -1.8 |
| MW28-5S | 10-20 | * | 0.2 | MW28-5S | 10-20 | 2 | -1.8 |
| MW29-1D | 28-32.8 | * | 0.2 | MW29-1D | 28-32.8 | 2 | -1.8 |
| MW29-2S | 10.5-20.4 | * | 0.2 | MW29-2S | 10.5-20.4 | 2 | -1.8 |
| MW30-1I | 33-35 | | 0.2 | MW30-1I | 30.2-34.9 | 2 | -1.8 |
| MW31-1D | 94.3-98.95 | * | 0.2 | MW31-1D | 94.25-98.95 | 2 | -1.8 |
| MW31-2I | 53.9-58.6 | * | 0.2 | MW31-2I | 53.9-58.6 | 2 | -1.8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.19 | MW31-3S | 12.9-22.6 | 2 | -1.81 |
| MW33-1D | 29.7-39.6 | * | 0.2 | MW33-1D | 29.7-39.6 | 2 | -1.8 |
| MW33-2S | 10-19.9 | * | 0.2 | MW33-2S | 10-19.9 | 2 | -1.8 |
| MW34-1D | 11-13 | | 0.5 | MW34-2S | 8.5-18.4 | 4 | -3.5 |
| MW34-1D | 35.75-45.6 | * | 0.2 | MW34-1D | 35.75-45.65 | 2 | -1.8 |
| MW35-1D | 35.8-45.7 | * | 0.19 | MW35-1D | 35.8-45.7 | 2 | -1.81 |
| MW35-2S | 23-27.9 | * | 0.2 | MW35-2S | 23-27.9 | 2 | -1.8 |
| MW36-1D | 12-15 | | 0.2 | MW36-3S | 7.7-17.6 | 2 | -1.8 |
| MW37-1D | 11-14 | | 0.2 | MW37-3S | 7.3-17.2 | 2 | -1.8 |
| MW37-1D | 53-55 | | 0.2 | MW37-2I | 44.8-54.75 | 2 | -1.8 |
| MW39-1D | 123-125 | | 0.2 | MW39-1D | 119.6-129.5 | 2 | -1.8 |
| PZ06 | 13-16 | | 1.9 | PZ06 | 11.8-21.8 | 0.6 | 1.3 |
| PZ14 | 11-13 | | 0.65 | PZ14 | 7-17 | 2 | -1.35 |
| PZ15 | 12.1-20 | | 0.2 | PZ15 | 12.1-22 | 2 | -1.8 |
| PZ32 | 9.1-19 | * | 0.26 | PZ32 | 9.1-19 | 2 | -1.74 |
| 04-517-M | 5-15 | * | 0.2 | 04-517-M | 5-15 | 2 | -1.8 |
| 14-552-M | 8.1-18.1 | * | 0.31 | 14-552-M | 8.1-18.1 | 2 | -1.69 |
| 14-553-M | 8-18 | * | 0.2 | 14-553-M | 8.3-18.3 | 2 | -1.8 |
| 14-554-M | 6-16 | * | 0.6 | 14-554-M | 5.9-15.9 | 2 | -1.4 |
| 14-626-M | 65-75 | * | 0.2 | 14-626-M | 65.2-75.2 | 2 | -1.8 |
| 583-M | 13-23 | * | 0.2 | 583-M | 13-23 | 2 | -1.8 |
| 584-M | 15.8-25.8 | * | 0.2 | 584-M | 15.8-25.8 | 2 | -1.8 |
| GR-333 | 25-35 | * | 1.6 | GR-333 | 25.1-35.1 | 1 | 0.6 |
| GR-334 | 150 | * | 0.2 | GR-334 | 145-155 | 2 | -1.8 |

ANALYTICAL RESULTS FOR CARBON TETRACHLORIDE IN GROUNDWATER
(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.2 | MW01-2D | 78-83 | 3 | -2.8 |
| MW02-1D | 66-68 | | 0.2 | MW02-1D | 68-78 | 3 | -2.8 |
| MW04-1S | 13-15 | | 0.2 | MW04-1S | 11.1-21.1 | 3 | -2.8 |
| MW04-3I | 32-34 | | 0.2 | MW04-3I | 26.7-31.7 | 3 | -2.8 |
| MW05-1D | 25-27 | | 0.2 | MW05-1D | 22-27 | 3 | -2.8 |
| MW05-2S | 12-14 | | 0.2 | MW05-2S | 7.5-17.4 | 3 | -2.8 |
| MW05-3D | 81-83 | | 0.2 | MW05-3D | 81.2-85.9 | 3 | -2.8 |
| MW07-1S | 8-10 | | 0.2 | MW07-1S | 6.6-16.6 | 3 | -2.8 |
| MW07-2D | 43-45 | | 0.2 | MW07-2D | 44.7-49.7 | 3 | -2.8 |
| MW07-3I | 25-27 | | 0.2 | MW07-3I | 22.35-27.2 | 3 | -2.8 |
| MW09-1D | 52-53 | | 0.2 | MW09-1D | 50.3-55.2 | 3 | -2.8 |
| MW09-2D | 161-163 | | 0.2 | MW09-2D | 163-168 | 3 | -2.8 |
| MW09-3I | 73-75 | | 0.2 | MW09-3I | 70-75 | 3 | -2.8 |
| MW10-1D | 52-56 | | 0.2 | MW10-2I | 51.5-56.5 | 3 | -2.8 |
| MW10-1D | 130-132 | | 0.2 | MW10-1D | 130.5-135.5 | 3 | -2.8 |
| MW13-1I | 37.8-47.8 | * | 0.2 | MW13-1I | 37.8-47.8 | 3 | -2.8 |
| MW16-1D | 33.2-37.9 | * | 0.2 | MW16-1D | 33.2-37.9 | 3 | -2.8 |
| MW17-1D | 9-10.5 | | 0.2 | MW17-4S | 7-17 | 3 | -2.8 |
| MW17-2D | 36-38 | | 0.2 | MW17-3I | 33-38 | 3 | -2.8 |
| MW17-2D | 98-100 | | 0.2 | MW17-2D | 95-99.9 | 3 | -2.8 |
| MW19-1D | 13-15 | | 0.2 | MW19-2S | 10.7-20.6 | 3 | -2.8 |
| MW19-1D | 37-49.2 | | 0.2 | MW19-1D | 37-46.9 | 3 | -2.8 |
| MW20-1D | 10-12 | | 0.2 | MW20-2S | 7.8-17.7 | 3 | -2.8 |
| MW20-1D | 30.8-35.8 | * | 0.2 | MW20-1D | 30.8-35.5 | 3 | -2.8 |
| MW21-1D | 10-12 | | 0.2 | MW21-3S | 8.9-18.9 | 3 | -2.8 |
| MW21-2D | 30.2-34.9 | * | 0.2 | MW21-2D | 30.2-34.9 | 3 | -2.8 |
| MW22-1D | 57.9-62.9 | * | 0.2 | MW22-1D | 57.9-62.9 | 3 | -2.8 |
| MW22-2I | 42.7-47.6 | * | 0.2 | MW22-2I | 42.7-47.6 | 3 | -2.8 |
| MW22-3S | 6.6-16.5 | * | 0.2 | MW22-3S | 6.6-16.5 | 3 | -2.8 |
| MW23-1D | 30.2-34.9 | * | 0.2 | MW23-1D | 30.2-34.9 | 3 | -2.8 |
| MW23-2S | 8.25-12.95 | * | 0.2 | MW23-2S | 8.25-12.95 | 3 | -2.8 |
| MW24-1D | 87-91.7 | * | 0.2 | MW24-1D | 87-91.7 | 3 | -2.8 |
| MW24-2S | 11.9-21.6 | * | 0.2 | MW24-2S | 11.9-21.6 | 3 | -2.8 |
| MW25-1D | 55-60 | * | 0.2 | MW25-1D | 55-60 | 3 | -2.8 |
| MW25-2I | 33-38 | * | 0.2 | MW25-2I | 33-38 | 6 | -5.8 |
| MW25-3S | 11-21 | * | 0.2 | MW25-3S | 11-21 | 3 | -2.8 |
| MW26-2I | 36.5-41.3 | * | 0.2 | MW26-2I | 36.5-41.3 | 3 | -2.8 |
| MW26-3S | 10-20 | * | 0.2 | MW26-3S | 10-20 | 30 | -29.8 |
| MW27-2D | 19-21 | | 0.2 | MW27-4S | 17.2-26.9 | 3 | -2.8 |
| MW27-2D | 94-96 | | 0.2 | MW27-2D | 93.3-98.2 | 3 | -2.8 |
| MW28-2D | 72.7-77.4 | * | 0.2 | MW28-2D | 72.7-77.4 | 3 | -2.8 |
| MW28-4I | 28-33 | * | 0.2 | MW28-4I | 28-30 | 3 | -2.8 |
| MW28-5S | 10-20 | * | 0.2 | MW28-5S | 10-20 | 3 | -2.8 |
| MW29-1D | 28-32.8 | * | 0.2 | MW29-1D | 28-32.8 | 3 | -2.8 |
| MW29-2S | 10.5-20.4 | * | 0.2 | MW29-2S | 10.5-20.4 | 3 | -2.8 |
| MW30-1I | 33-35 | | 0.2 | MW30-1I | 30.2-34.9 | 3 | -2.8 |
| MW31-1D | 94.3-98.95 | * | 0.2 | MW31-1D | 94.25-98.95 | 3 | -2.8 |
| MW31-2I | 53.9-58.6 | * | 0.2 | MW31-2I | 53.9-58.6 | 3 | -2.8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.2 | MW31-3S | 12.9-22.6 | 3 | -2.8 |
| MW33-1D | 29.7-39.6 | * | 0.2 | MW33-1D | 29.7-39.6 | 3 | -2.8 |
| MW33-2S | 10-19.9 | * | 0.2 | MW33-2S | 10-19.9 | 3 | -2.8 |
| MW34-1D | 11-13 | | 0.2 | MW34-2S | 8.5-18.4 | 3 | -2.8 |
| MW34-1D | 35.75-45.6 | * | 0.2 | MW34-1D | 35.75-45.65 | 3 | -2.8 |
| MW35-1D | 35.8-45.7 | * | 0.2 | MW35-1D | 35.8-45.7 | 3 | -2.8 |
| MW35-2S | 23-27.9 | * | 0.2 | MW35-2S | 23-27.9 | 3 | -2.8 |
| MW36-1D | 12-15 | | 0.2 | MW36-3S | 7.7-17.6 | 3 | -2.8 |
| MW37-1D | 11-14 | | 0.2 | MW37-3S | 7.3-17.2 | 3 | -2.8 |
| MW37-1D | 53-55 | | 0.2 | MW37-2I | 44.8-54.75 | 3 | -2.8 |
| MW39-1D | 123-125 | | 0.2 | MW39-1D | 119.6-129.5 | 3 | -2.8 |
| PZ06 | 13-16 | | 0.2 | PZ06 | 11.8-21.8 | 3 | -2.8 |
| PZ14 | 11-13 | | 0.2 | PZ14 | 7-17 | 3 | -2.8 |
| PZ15 | 12.1-20 | | 0.2 | PZ15 | 12.1-22 | 3 | -2.8 |
| PZ32 | 9.1-19 | * | 0.2 | PZ32 | 9.1-19 | 3 | -2.8 |
| 04-517-M | 5-15 | * | 0.2 | 04-517-M | 5-15 | 3 | -2.8 |
| 14-552-M | 8.1-18.1 | * | 0.2 | 14-552-M | 8.1-18.1 | 3 | -2.8 |
| 14-553-M | 8-18 | * | 0.2 | 14-553-M | 8.3-18.3 | 3 | -2.8 |
| 14-554-M | 6-16 | * | 0.2 | 14-554-M | 5.9-15.9 | 3 | -2.8 |
| 14-626-M | 65-75 | * | 0.2 | 14-626-M | 65.2-75.2 | 3 | -2.8 |
| 583-M | 13-23 | * | 0.2 | 583-M | 13-23 | 3 | -2.8 |
| 584-M | 15.8-25.8 | * | 0.2 | 584-M | 15.8-25.8 | 3 | -2.8 |
| GR-333 | 25-35 | * | 0.26 | GR-333 | 25.1-35.1 | 3 | -2.74 |
| GR-334 | 150 | * | 0.2 | GR-334 | 145-155 | 3 | -2.8 |

ANALYTICAL RESULTS FOR TRICHLOROETHENE IN GROUNDWATER
(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.2 | MW01-2D | 78-83 | 1 | -0.8 |
| MW02-1D | 66-68 | | 1 | MW02-1D | 68-78 | 1 | 0 |
| MW04-1S | 13-15 | | 0.2 | MW04-1S | 11.1-21.1 | 1 | -0.8 |
| MW04-3I | 32-34 | | 0.2 | MW04-3I | 26.7-31.7 | 1 | -0.8 |
| MW05-1D | 25-27 | | 0.2 | MW05-1D | 22-27 | 1 | -0.8 |
| MW05-2S | 12-14 | | 0.2 | MW05-2S | 7.5-17.4 | 1 | -0.8 |
| MW05-3D | 81-83 | | 0.2 | MW05-3D | 81.2-85.9 | 1 | -0.8 |
| MW07-1S | 8-10 | | 1 | MW07-1S | 6.6-16.6 | 1 | 0 |
| MW07-2D | 43-45 | | 0.2 | MW07-2D | 44.7-49.7 | 1 | -0.8 |
| MW07-3I | 25-27 | | 0.2 | MW07-3I | 22.35-27.2 | 1 | -0.8 |
| MW09-1D | 52-53 | | 0.2 | MW09-1D | 50.3-55.2 | 1 | -0.8 |
| MW09-2D | 161-163 | | 0.2 | MW09-2D | 163-168 | 1 | -0.8 |
| MW09-3I | 73-75 | | 0.2 | MW09-3I | 70-75 | 1 | -0.8 |
| MW10-1D | 52-56 | | 0.2 | MW10-2I | 51.5-56.5 | 1 | -0.8 |
| MW10-1D | 130-132 | | 0.2 | MW10-1D | 130.5-135.5 | 1 | -0.8 |
| MW13-1I | 37.8-47.8 | * | 0.2 | MW13-1I | 37.8-47.8 | 1 | -0.8 |
| MW16-1D | 33.2-37.9 | * | 0.2 | MW16-1D | 33.2-37.9 | 1 | -0.8 |
| MW17-1D | 9-10.5 | | 0.2 | MW17-4S | 7-17 | 1 | -0.8 |
| MW17-2D | 36-38 | | 0.2 | MW17-3I | 33-38 | 1 | -0.8 |
| MW17-2D | 98-100 | | 0.2 | MW17-2D | 95-99.9 | 1 | -0.8 |
| MW19-1D | 13-15 | | 0.2 | MW19-2S | 10.7-20.6 | 1 | -0.8 |
| MW19-1D | 37-49.2 | | 0.2 | MW19-1D | 37-46.9 | 1 | -0.8 |
| MW20-1D | 10-12 | | 0.2 | MW20-2S | 7.8-17.7 | 1 | -0.8 |
| MW20-1D | 30.8-35.8 | * | 0.2 | MW20-1D | 30.8-35.5 | 1 | -0.8 |
| MW21-1D | 10-12 | | 0.2 | MW21-3S | 8.9-18.9 | 1 | -0.8 |
| MW21-2D | 30.2-34.9 | * | 0.2 | MW21-2D | 30.2-34.9 | 1 | -0.8 |
| MW22-1D | 57.9-62.9 | * | 0.2 | MW22-1D | 57.9-62.9 | 1 | -0.8 |
| MW22-2I | 42.7-47.6 | * | 0.2 | MW22-2I | 42.7-47.6 | 1 | -0.8 |
| MW22-3S | 6.6-16.5 | * | 0.2 | MW22-3S | 6.6-16.5 | 1 | -0.8 |
| MW23-1D | 30.2-34.9 | * | 0.2 | MW23-1D | 30.2-34.9 | 1 | -0.8 |
| MW23-2S | 8.25-12.95 | * | 0.2 | MW23-2S | 8.25-12.95 | 1 | -0.8 |
| MW24-1D | 87-91.7 | * | 0.2 | MW24-1D | 87-91.7 | 1 | -0.8 |
| MW24-2S | 11.9-21.6 | * | 0.2 | MW24-2S | 11.9-21.6 | 1 | -0.8 |
| MW25-1D | 55-60 | * | 0.2 | MW25-1D | 55-60 | 1 | -0.8 |
| MW25-2I | 33-38 | * | 0.2 | MW25-2I | 33-38 | 2 | -1.8 |
| MW25-3S | 11-21 | * | 0.2 | MW25-3S | 11-21 | 1 | -0.8 |
| MW26-2I | 36.5-41.3 | * | 0.2 | MW26-2I | 36.5-41.3 | 1 | -0.8 |
| MW26-3S | 10-20 | * | 0.2 | MW26-3S | 10-20 | 11 | -10.8 |
| MW27-2D | 19-21 | | 0.2 | MW27-4S | 17.2-26.9 | 1 | -0.8 |
| MW27-2D | 94-96 | | 0.2 | MW27-2D | 93.3-98.2 | 1 | -0.8 |
| MW28-2D | 72.7-77.4 | * | 0.2 | MW28-2D | 72.7-77.4 | 1 | -0.8 |
| MW28-4I | 28-33 | * | 0.18 | MW28-4I | 28-30 | 1 | -0.82 |
| MW28-5S | 10-20 | * | 0.2 | MW28-5S | 10-20 | 1 | -0.8 |
| MW29-1D | 28-32.8 | * | 0.2 | MW29-1D | 28-32.8 | 1 | -0.8 |
| MW29-2S | 10.5-20.4 | * | 0.2 | MW29-2S | 10.5-20.4 | 1 | -0.8 |
| MW30-1I | 33-35 | | 0.2 | MW30-1I | 30.2-34.9 | 1 | -0.8 |
| MW31-1D | 94.3-98.95 | * | 0.2 | MW31-1D | 94.25-98.95 | 1 | -0.8 |
| MW31-2I | 53.9-58.6 | * | 0.2 | MW31-2I | 53.9-58.6 | 1 | -0.8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.2 | MW31-3S | 12.9-22.6 | 1 | -0.8 |
| MW33-1D | 29.7-39.6 | * | 0.2 | MW33-1D | 29.7-39.6 | 1 | -0.8 |
| MW33-2S | 10-19.9 | * | 0.2 | MW33-2S | 10-19.9 | 1 | -0.8 |
| MW34-1D | 11-13 | | 0.2 | MW34-2S | 8.5-18.4 | 15 | -14.8 |
| MW34-1D | 35.75-45.6 | * | 0.2 | MW34-1D | 35.75-45.65 | 1 | -0.8 |
| MW35-1D | 35.8-45.7 | * | 0.2 | MW35-1D | 35.8-45.7 | 1 | -0.8 |
| MW35-2S | 23-27.9 | * | 0.2 | MW35-2S | 23-27.9 | 1 | -0.8 |
| MW36-1D | 12-15 | | 0.52 | MW36-3S | 7.7-17.6 | 1 | -0.48 |
| MW37-1D | 11-14 | | 0.2 | MW37-3S | 7.3-17.2 | 1 | -0.8 |
| MW37-1D | 53-55 | | 0.2 | MW37-2I | 44.8-54.75 | 1 | -0.8 |
| MW39-1D | 123-125 | | 0.2 | MW39-1D | 119.6-129.5 | 1 | -0.8 |
| PZ06 | 13-16 | | 0.2 | PZ06 | 11.8-21.8 | 1 | -0.8 |
| PZ14 | 11-13 | | 0.2 | PZ14 | 7-17 | 1 | -0.8 |
| PZ15 | 12.1-20 | | 0.2 | PZ15 | 12.1-22 | 1 | -0.8 |
| PZ32 | 9.1-19 | * | 0.2 | PZ32 | 9.1-19 | 1 | -0.8 |
| 04-517-M | 5-15 | * | 0.18 | 04-517-M | 5-15 | 1 | -0.32 |
| 14-552-M | 8.1-18.1 | * | 0.2 | 14-552-M | 8.1-18.1 | 1 | -0.8 |
| 14-553-M | 8-18 | * | 0.2 | 14-553-M | 8.3-18.3 | 1 | -0.8 |
| 14-554-M | 6-16 | * | 0.2 | 14-554-M | 5.9-15.9 | 1 | -0.8 |
| 14-626-M | 65-75 | * | 0.2 | 14-626-M | 65.2-75.2 | 1 | -0.8 |
| 583-M | 13-23 | * | 0.2 | 583-M | 13-23 | 1 | -0.8 |
| 584-M | 15.8-25.8 | * | 0.2 | 584-M | 15.8-25.8 | 1 | -0.8 |
| GR-333 | 25-35 | * | 5.1 | GR-333 | 25.1-35.1 | 5 | 0.1 |
| GR-334 | 150 | * | 0.2 | GR-334 | 145-155 | 1 | -0.8 |

## ANALYTICAL RESULTS FOR TETRACHLOROETHENE IN GROUNDWATER
(Results are in micrograms per liter)

| On-Site ID | Depth (feet) | Well Sample | Value | Off-Site ID (Well No.) | Depth Screen | Value | Analytical Difference |
|---|---|---|---|---|---|---|---|
| MW01-2D | 77-79 | | 0.2 | MW01-2D | 78-83 | 1 | -0.8 |
| MW02-1D | 66-68 | | 0.44 | MW02-1D | 68-78 | 1 | -0.56 |
| MW04-1S | 13-15 | | 0.2 | MW04-1S | 11.1-21.1 | 1 | -0.8 |
| MW04-3I | 32-34 | | 0.2 | MW04-3I | 26.7-31.7 | 1 | -0.8 |
| MW05-1D | 25-27 | | 0.2 | MW05-1D | 22-27 | 1 | -0.8 |
| MW05-2S | 12-14 | | 0.2 | MW05-2S | 7.5-17.4 | 1 | -0.8 |
| MW05-3D | 81-83 | | 0.2 | MW05-3D | 81.2-85.9 | 1 | -0.8 |
| MW07-1S | 8-10 | | 0.2 | MW07-1S | 6.6-16.6 | 1 | -0.8 |
| MW07-2D | 43-45 | | 0.2 | MW07-2D | 44.7-49.7 | 1 | -0.8 |
| MW07-3I | 25-27 | | 0.2 | MW07-3I | 22.35-27.2 | 1 | -0.8 |
| MW09-1D | 52-53 | | 0.2 | MW09-1D | 50.3-55.2 | 1 | -0.8 |
| MW09-2D | 161-163 | | 0.2 | MW09-2D | 163-168 | 1 | -0.8 |
| MW09-3I | 73-75 | | 0.2 | MW09-3I | 70-75 | 1 | -0.8 |
| MW10-1D | 52-56 | | 0.2 | MW10-2I | 51.5-56.5 | 1 | -0.8 |
| MW10-1D | 130-132 | | 0.2 | MW10-1D | 130.5-135.5 | 1 | -0.8 |
| MW13-1I | 37.8-47.8 | * | 0.2 | MW13-1I | 37.8-47.8 | 1 | -0.8 |
| MW16-1D | 33.2-37.9 | * | 0.2 | MW16-1D | 33.2-37.9 | 1 | -0.8 |
| MW17-1D | 9-10.5 | | 0.2 | MW17-4S | 7-17 | 1 | -0.8 |
| MW17-2D | 36-38 | | 0.2 | MW17-3I | 33-38 | 1 | -0.8 |
| MW17-2D | 98-100 | | 0.2 | MW17-2D | 95-99.9 | 1 | -0.8 |
| MW19-1D | 13-15 | | 0.2 | MW19-2S | 10.7-20.6 | 1 | -0.8 |
| MW19-1D | 37-49.2 | | 0.2 | MW19-1D | 37-46.9 | 1 | -0.8 |
| MW20-1D | 10-12 | | 0.2 | MW20-2S | 7.8-17.7 | 1 | -0.8 |
| MW20-1D | 30.8-35.8 | * | 0.2 | MW20-1D | 30.8-35.5 | 1 | -0.8 |
| MW21-1D | 10-12 | | 0.2 | MW21-3S | 8.9-18.9 | 1 | -0.8 |
| MW21-2D | 30.2-34.9 | * | 0.2 | MW21-2D | 30.2-34.9 | 1 | -0.8 |
| MW22-1D | 57.9-62.9 | * | 0.2 | MW22-1D | 57.9-62.9 | 1 | -0.8 |
| MW22-2I | 42.7-47.6 | * | 0.2 | MW22-2I | 42.7-47.6 | 1 | -0.8 |
| MW22-3S | 6.6-16.5 | * | 0.2 | MW22-3S | 6.6-16.5 | 1 | -0.8 |
| MW23-1D | 30.2-34.9 | * | 0.2 | MW23-1D | 30.2-34.9 | 1 | -0.8 |
| MW23-2S | 8.25-12.95 | * | 0.2 | MW23-2S | 8.25-12.95 | 1 | -0.8 |
| MW24-1D | 87-91.7 | * | 0.2 | MW24-1D | 87-91.7 | 1 | -0.8 |
| MW24-2S | 11.9-21.6 | * | 0.2 | MW24-2S | 11.9-21.6 | 1 | -0.8 |
| MW25-1D | 55-60 | * | 0.2 | MW25-1D | 55-60 | 1 | -0.8 |
| MW25-2I | 33-38 | * | 0.2 | MW25-2I | 33-38 | 2 | -1.8 |
| MW25-3S | 11-21 | * | 0.2 | MW25-3S | 11-21 | 1 | -0.8 |
| MW26-2I | 36.5-41.3 | * | 0.2 | MW26-2I | 36.5-41.3 | 1 | -0.8 |
| MW26-3S | 10-20 | * | 0.2 | MW26-3S | 10-20 | 10 | -9.8 |
| MW27-2D | 19-21 | | 5.6 | MW27-4S | 17.2-26.9 | 5 | 0.6 |
| MW27-2D | 94-96 | | 0.2 | MW27-2D | 93.3-98.2 | 1 | -0.8 |
| MW28-2D | 72.7-77.4 | * | 0.2 | MW28-2D | 72.7-77.4 | 1 | -0.8 |
| MW28-4I | 28-33 | * | 0.2 | MW28-4I | 28-30 | 1 | -0.8 |
| MW28-5S | 10-20 | * | 0.2 | MW28-5S | 10-20 | 1 | -0.8 |
| MW29-1D | 28-32.8 | * | 0.2 | MW29-1D | 28-32.8 | 1 | -0.8 |
| MW29-2S | 10.5-20.4 | * | 0.2 | MW29-2S | 10.5-20.4 | 1 | -0.8 |
| MW30-1I | 33-35 | | 0.2 | MW30-1I | 30.2-34.9 | 1 | -0.8 |
| MW31-1D | 94.3-98.95 | * | 0.2 | MW31-1D | 94.25-98.95 | 1 | -0.8 |
| MW31-2I | 53.9-58.6 | * | 0.2 | MW31-2I | 53.9-58.6 | 1 | -0.8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MW31-3S | 12.9-22.6 | * | 0.25 | MW31-3S | 12.9-22.6 | 1 | -0.75 |
| MW33-1D | 29.7-39.6 | * | 0.2 | MW33-1D | 29.7-39.6 | 1 | -0.8 |
| MW33-2S | 10-19.9 | * | 0.2 | MW33-2S | 10-19.9 | 1 | -0.8 |
| MW34-1D | 11-13 | | 0.2 | MW34-2S | 8.5-18.4 | 1 | -0.8 |
| MW34-1D | 35.75-45.6 | * | 0.2 | MW34-1D | 35.75-45.65 | 1 | -0.8 |
| MW35-1D | 35.8-45.7 | * | 0.25 | MW35-1D | 35.8-45.7 | 1 | -0.75 |
| MW35-2S | 23-27.9 | * | 0.2 | MW35-2S | 23-27.9 | 1 | -0.8 |
| MW36-1D | 12-15 | | 0.2 | MW36-3S | 7.7-17.6 | 1 | -0.8 |
| MW37-1D | 11-14 | | 0.2 | MW37-3S | 7.3-17.2 | 1 | -0.8 |
| MW37-1D | 53-55 | | 0.2 | MW37-2I | 44.8-54.75 | 1 | -0.8 |
| MW39-1D | 123-125 | | 0.2 | MW39-1D | 119.6-129.5 | 1 | -0.8 |
| PZ06 | 13-16 | | 0.2 | PZ06 | 11.8-21.8 | 1 | -0.8 |
| PZ14 | 11-13 | | 0.2 | PZ14 | 7-17 | 1 | -0.8 |
| PZ15 | 12.1-20 | | 0.2 | PZ15 | 12.1-22 | 1 | -0.8 |
| PZ32 | 9.1-19 | * | 0.2 | PZ32 | 9.1-19 | 1 | -0.8 |
| 04-517-M | 5-15 | * | 0.2 | 04-517-M | 5-15 | 1 | -0.8 |
| 14-552-M | 8.1-18.1 | * | 0.2 | 14-552-M | 8.1-18.1 | 1 | -0.8 |
| 14-553-M | 8-18 | * | 0.2 | 14-553-M | 8.3-18.3 | 1 | -0.8 |
| 14-554-M | 6-16 | * | 0.2 | 14-554-M | 5.9-15.9 | 1 | -0.8 |
| 14-626-M | 65-75 | * | 0.2 | 14-626-M | 65.2-75.2 | 1 | -0.8 |
| 583-M | 13-23 | * | 0.7 | 583-M | 13-23 | 1 | -0.3 |
| 584-M | 15.8-25.8 | * | 0.2 | 584-M | 15.8-25.8 | 1 | -0.8 |
| GR-333 | 25-35 | * | 0.34 | GR-333 | 25.1-35.1 | 1 | -0.66 |
| GR-334 | 150 | * | 0.2 | GR-334 | 145-155 | 1 | -0.8 |

**APPENDIX H**
**Soil Data Comparison Tables for On-Site Lab Generated Data Versus CLP (Off-Site) Generated Data**

ANALYTICAL RESULTS FOR BENZENE IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 1 | MW01-1S-SS02 | 16-17 | 11 | -10 |
| MW02-1D | 75-76 | 1 | MW02-1D-SS03 | 75-76 | 11 | -10 |
| MW04-1S | 25 | 1 | MW04-1S-SS03 | 25-30 | 10 | -9 |
| MW09-1D | 15 | 1 | MW09-1D-SS02 | 12-14 | 11 | -10 |
| MW09-3I | 74-75 | 1 | MW09-3I-SS01 | 74-75 | 11 | -10 |
| MW10-1D | 5 | 1 | MW10-1D-SS02 | 7-8 | 11 | -10 |
| MW13-1I | 6.8-7.2 | 1 | MW13-1I-SS02 | 7 | 10 | -9 |
| MW13-1I | 15 | 1 | MW13-1I-SS03 | 13-14 | 2 | -1 |
| MW16-1D | 8 | 1 | MW16-1D-SS02 | 7-8 | 11 | -10 |
| MW20-1D | 10 | 4800 | MW20-1D-SS03 | 10-12 | 27000 | -22200 |
| MW20-1D | 20 | 960 | MW20-1D-SS04 | 19-20 | 27000 | -26040 |
| MW21-1D | 0 | 61 | MW21-1D-SS01 | 0-1 | 20 | 41 |
| MW21-1D | 10 | 18000 | MW21-1D-SS02 | 10-11 | 12000 | 6000 |
| MW23-1D | 32 | 1 | MW23-1D-SS03 | 31-32 | 11 | -10 |
| MW24-1D | 87 | 1 | MW24-1D-SS02 | 87-88 | 2 | -1 |
| MW25-2I | 15 | 15 | MW25-2I-SS01 | 14-15 | 57 | -42 |
| MW27-2D | 20 | 1 | MW27-2D-SS02 | 19-20 | 11 | -10 |
| MW27-2D | 30 | 1 | MW27-2D-SS03 | 27-28 | 11 | -10 |
| MW27-3I | 46 | 1 | MW27-3I-SS01 | 45-46 | 11 | -10 |
| MW31-1D | 95-96 | 1 | MW31-1D-SS03 | 95-96 | 11 | -10 |
| MW36-1D | 15 | 1 | MW36-1D-SS02 | 12-14 | 11 | -10 |
| MW38-1I | 10 | 1 | MW38-1I-SS02 | 11-13 | 11 | -10 |
| MW38-1I | 43 | 1 | MW38-1I-SS03 | 41-43 | 11 | -10 |
| PZ03 | 10 | 3.1 | PZ03-SS02 | 9-10 | 10 | -6.9 |
| PZ12 | 0 | 1 | PZ12-SS01 | 0-1 | 12 | -11 |
| PZ14 | 10 | 1 | PZ14-SS03 | 10-12 | 11 | -10 |
| SB04 | 10 | 1 | SB04-SS03 | 13-14 | 11 | -10 |
| SB07 | 10 | 1 | SB07-SS02 | 8-10 | 10 | -9 |
| SB07 | 15 | 1 | SB07-SS03 | 10-12 | 11 | -10 |
| SB10 | 10 | 1 | SB10-SS02 | 8-10 | 11 | -10 |
| SB11 | 5 | 1 | SB11-SS02 | 5-6 | 10 | -9 |
| SB13 | 17 | 1 | SB13-SS03 | 16-17 | 11 | -10 |
| SB17 | 15 | 1 | SB17-SS03 | 13-15 | 11 | -10 |
| SB20 | 10 | 1 | SB20-SS03 | 10-12 | 11 | -10 |
| SB21 | 5 | 1 | SB21-SS02 | 5-7 | 11 | -10 |
| SB21 | 15 | 1 | SB21-SS03 | 13-15 | 11 | -10 |
| SB22 | 0 | 1 | SB22-SS01 | 0-1 | 12 | -11 |
| SB22 | 15 | 10.6 | SB22-SS02 | 12-13 | 10 | 0.6 |
| SB22 | 20 | 1.1 | SB22-SS03 | 20-22 | 11 | -9.9 |
| SB23 | 0 | 1 | SB23-SS01 | 0-1 | 4 | -3 |
| SB23 | 5 | 1.2 | SB23-SS02 | 4-5 | 2 | -0.8 |
| SB27 | 0 | 1 | SB27-SS01 | 0-1 | 11 | -10 |
| SB30 | 0 | 20 | SB30-SS01 | 0-3 | 6 | 14 |
| SB30 | 5 | 750 | SB30-SS02 | 4-5 | 860 | -110 |
| SB30 | 10 | 3400 | SB30-SS03 | 8-10 | 12000 | -8600 |
| SB31 | 10 | 29 | SB31-SS03 | 8-10 | 16 | 13 |
| SB34 | 15 | 1 | SB34-SS01 | 14-15 | 11 | -10 |
| SB35 | 30 | 1 | SB35-SS01 | 30-32 | 11 | -10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 1.1 | SB37-SS02 | 7-8 | 11 | -9.9 |
| SB44 | 21 | 1 | SB44-SS03 | 21-22 | 11 | -10 |
| SB45 | 38 | 1 | SB45-SS01 | 37-38 | 11 | -10 |
| SB46 | 15 | 1 | SB46-SS01 | 14-15 | 11 | -10 |
| SB47 | 45 | 1 | SB47-SS01 | 44-45 | 11 | -10 |
| SB48 | 14 | 1 | SB48-SS01 | 14-15 | 12 | -11 |
| SB49 | 45 | 1 | SB49-SS01 | 44-45 | 11 | -10 |
| SB50 | 40 | 1 | SB50-SS02 | 40-42 | 11 | -10 |
| SB51 | 54 | 1 | SB51-SS01 | 53-54 | 12 | -11 |
| SB52 | 30 | 1 | SB52-SS01 | 30-32 | 11 | -10 |
| SB53 | 30 | 1 | SB53-SS01 | 30-32 | 11 | -10 |
| SB54 | 30 | 1 | SB54-SS01 | 30-31 | 11 | -10 |
| SB55 | 30 | 1 | SB55-SS01 | 30-31 | 11 | -10 |
| SB58 | 30 | 1 | SB58-SS01 | 30-32 | 11 | -10 |
| SB60 | 35 | 1 | SB60-SS02 | 37-38 | 11 | -10 |
| SB61 | 15 | 1 | SB61-SS02 | 14-15 | 11 | -10 |
| SB61 | 30 | 1 | SB61-SS03 | 30-31 | 11 | -10 |
| SB64 | 15 | 2 | SB64-SS02 | 12-14 | 11 | -9 |
| SB65 | 50 | 1 | SB65-SS01 | 48-50 | 11 | -10 |
| SB66 | 25 | 1 | SB66-SS02 | 23-25 | 11 | -10 |
| SB66 | 35 | 1 | SB66-SS03 | 35-37 | 11 | -10 |
| SB67 | 45 | 1 | SB67-SS01 | 43-45 | ND | #VALUE! |
| SB69 | 10 | 1 | SB69-SS02 | 8-10 | ND | #VALUE! |
| SB71 | 45 | 1 | SB71-SS01 | 46-48 | ND | #VALUE! |
| SB73 | 45 | 1 | SB73-SS02 | 45-47 | ND | #VALUE! |
| SB73 | 55 | 1 | SB73-SS03 | 55-57 | ND | #VALUE! |
| SB74 | 48 | 1 | SB74-SS01 | 46-48 | 11 | -10 |
| SB76 | 80 | 1 | SB76-SS04 | 80-82 | 11 | -10 |
| SB76 | 100 | 1 | SB76-SS05 | 100-102 | 11 | -10 |
| SB77 | 60 | 1 | SB77-SS01 | 58-60 | 11 | -10 |

## ANALYTICAL RESULTS FOR TOLUENE IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 1.8 | MW01-1S-SS02 | 16-17 | 2 | -0.2 |
| MW02-1D | 75-76 | 1 | MW02-1D-SS03 | 75-76 | 11 | -10 |
| MW04-1S | 25 | 1 | MW04-1S-SS03 | 25-30 | 10 | -9 |
| MW09-1D | 15 | 1 | MW09-1D-SS02 | 12-14 | 11 | -10 |
| MW09-3I | 74-75 | 1 | MW09-3I-SS01 | 74-75 | 2 | -1 |
| MW10-1D | 5 | 1.9 | MW10-1D-SS02 | 7-8 | 11 | -9.1 |
| MW13-1I | 6.8-7.2 | 1 | MW13-1I-SS02 | 7 | 2 | -1 |
| MW13-1I | 15 | 1 | MW13-1I-SS03 | 13-14 | 4 | -3 |
| MW16-1D | 8 | 1 | MW16-1D-SS02 | 7-8 | 2 | -1 |
| MW20-1D | 10 | 2400 | MW20-1D-SS03 | 10-12 | 27000 | -24600 |
| MW20-1D | 20 | 510 | MW20-1D-SS04 | 19-20 | 27000 | -26490 |
| MW21-1D | 0 | 9.5 | MW21-1D-SS01 | 0-1 | 34 | -24.5 |
| MW21-1D | 10 | 15000 | MW21-1D-SS02 | 10-11 | 99000 | -84000 |
| MW23-1D | 32 | 1 | MW23-1D-SS03 | 31-32 | 11 | -10 |
| MW24-1D | 87 | 1 | MW24-1D-SS02 | 87-88 | 7 | -6 |
| MW25-2I | 15 | 21 | MW25-2I-SS01 | 14-15 | 9 | 12 |
| MW27-2D | 20 | 1.4 | MW27-2D-SS02 | 19-20 | 11 | -9.6 |
| MW27-2D | 30 | 1 | MW27-2D-SS03 | 27-28 | 11 | -10 |
| MW27-3I | 46 | 1 | MW27-3I-SS01 | 45-46 | 11 | -10 |
| MW31-1D | 95-96 | 1 | MW31-1D-SS03 | 95-96 | 2 | -1 |
| MW36-1D | 15 | 1.1 | MW36-1D-SS02 | 12-14 | 2 | -0.9 |
| MW38-1I | 10 | 2.6 | MW38-1I-SS02 | 11-13 | 11 | -8.4 |
| MW38-1I | 43 | 1 | MW38-1I-SS03 | 41-43 | 2 | -1 |
| PZ03 | 10 | 7.1 | PZ03-SS02 | 9-10 | 7 | 0.1 |
| PZ12 | 0 | 1 | PZ12-SS01 | 0-1 | 12 | -11 |
| PZ14 | 10 | 1.8 | PZ14-SS03 | 10-12 | 11 | -9.2 |
| SB04 | 10 | 3.3 | SB04-SS03 | 13-14 | 11 | -7.7 |
| SB07 | 10 | 2.4 | SB07-SS02 | 8-10 | 2 | 0.4 |
| SB07 | 15 | 1 | SB07-SS03 | 10-12 | 11 | -10 |
| SB10 | 10 | 2.2 | SB10-SS02 | 8-10 | 2 | 0.2 |
| SB11 | 5 | 1.7 | SB11-SS02 | 5-6 | 2 | -0.3 |
| SB13 | 17 | 1.1 | SB13-SS03 | 16-17 | 11 | -9.9 |
| SB17 | 15 | 1 | SB17-SS03 | 13-15 | 11 | -10 |
| SB20 | 10 | 1 | SB20-SS03 | 10-12 | 3 | -2 |
| SB21 | 5 | 2 | SB21-SS02 | 5-7 | 3 | -1 |
| SB21 | 15 | 1 | SB21-SS03 | 13-15 | 2 | -1 |
| SB22 | 0 | 1 | SB22-SS01 | 0-1 | 8 | -7 |
| SB22 | 15 | 8.3 | SB22-SS02 | 12-13 | 10 | -1.7 |
| SB22 | 20 | 2.2 | SB22-SS03 | 20-22 | 11 | -8.8 |
| SB23 | 0 | 1 | SB23-SS01 | 0-1 | 18 | -17 |
| SB23 | 5 | 1 | SB23-SS02 | 4-5 | 5 | -4 |
| SB27 | 0 | 1 | SB27-SS01 | 0-1 | 11 | -10 |
| SB30 | 0 | 1 | SB30-SS01 | 0-3 | 11 | -10 |
| SB30 | 5 | 360 | SB30-SS02 | 4-5 | 1500 | -1140 |
| SB30 | 10 | 2800 | SB30-SS03 | 8-10 | 30000 | -27200 |
| SB31 | 10 | 35 | SB31-SS03 | 8-10 | 56 | -21 |
| SB34 | 15 | 1 | SB34-SS01 | 14-15 | 11 | -10 |
| SB35 | 30 | 1 | SB35-SS01 | 30-32 | 11 | -10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 2.2 | SB37-SS02 | 7-8 | 11 | -8.8 |
| SB44 | 21 | 1.2 | SB44-SS03 | 21-22 | 11 | -9.8 |
| SB45 | 38 | 1 | SB45-SS01 | 37-38 | 11 | -10 |
| SB46 | 15 | 1 | SB46-SS01 | 14-15 | 11 | -10 |
| SB47 | 45 | 1 | SB47-SS01 | 44-45 | 11 | -10 |
| SB48 | 14 | 1 | SB48-SS01 | 14-15 | 12 | -11 |
| SB49 | 45 | 1 | SB49-SS01 | 44-45 | 11 | -10 |
| SB50 | 40 | 1 | SB50-SS02 | 40-42 | 2 | -1 |
| SB51 | 54 | 1 | SB51-SS01 | 53-54 | 12 | -11 |
| SB52 | 30 | 1 | SB52-SS01 | 30-32 | 11 | -10 |
| SB53 | 30 | 1 | SB53-SS01 | 30-32 | 11 | -10 |
| SB54 | 30 | 1 | SB54-SS01 | 30-31 | 2 | -1 |
| SB55 | 30 | 1 | SB55-SS01 | 30-31 | 2 | -1 |
| SB58 | 30 | 1 | SB58-SS01 | 30-32 | 11 | -10 |
| SB60 | 35 | 1 | SB60-SS02 | 37-38 | 11 | -10 |
| SB61 | 15 | 1 | SB61-SS02 | 14-15 | 1 | 0 |
| SB61 | 30 | 1 | SB61-SS03 | 30-31 | 11 | -10 |
| SB64 | 15 | 2.4 | SB64-SS02 | 12-14 | 2 | 0.4 |
| SB65 | 50 | 1 | SB65-SS01 | 48-50 | 11 | -10 |
| SB66 | 25 | 1.1 | SB66-SS02 | 23-25 | 2 | -0.9 |
| SB66 | 35 | 1 | SB66-SS03 | 35-37 | 3 | -2 |
| SB67 | 45 | 1 | SB67-SS01 | 43-45 | ND | #VALUE! |
| SB69 | 10 | 1 | SB69-SS02 | 8-10 | ND | #VALUE! |
| SB71 | 45 | 2.5 | SB71-SS01 | 46-48 | ND | #VALUE! |
| SB73 | 45 | 1 | SB73-SS02 | 45-47 | ND | #VALUE! |
| SB73 | 55 | 1 | SB73-SS03 | 55-57 | ND | #VALUE! |
| SB74 | 48 | 1.3 | SB74-SS01 | 46-48 | 11 | -9.7 |
| SB76 | 80 | 1 | SB76-SS04 | 80-82 | 2 | -1 |
| SB76 | 100 | 1 | SB76-SS05 | 100-102 | 11 | -10 |
| SB77 | 60 | 1 | SB77-SS01 | 58-60 | 3 | -2 |

ANALYTICAL RESULTS FOR ETHYLBENZENE IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 1 | MW01-1S-SS02 | 16-17 | 11 | -10 |
| MW02-1D | 75-76 | 1 | MW02-1D-SS03 | 75-76 | 2 | -1 |
| MW04-1S | 25 | 1 | MW04-1S-SS03 | 25-30 | 2 | -1 |
| MW09-1D | 15 | 1 | MW09-1D-SS02 | 12-14 | 11 | -10 |
| MW09-3I | 74-75 | 1 | MW09-3I-SS01 | 74-75 | 11 | -10 |
| MW10-1D | 5 | 1 | MW10-1D-SS02 | 7-8 | 11 | -10 |
| MW13-1I | 6.8-7.2 | 1 | MW13-1I-SS02 | 7 | 10 | -9 |
| MW13-1I | 15 | 1 | MW13-1I-SS03 | 13-14 | 11 | -10 |
| MW16-1D | 8 | 1 | MW16-1D-SS02 | 7-8 | 11 | -10 |
| MW20-1D | 10 | 18000 | MW20-1D-SS03 | 10-12 | 21000 | -3000 |
| MW20-1D | 20 | 2400 | MW20-1D-SS04 | 19-20 | 32000 | -29600 |
| MW21-1D | 0 | 74 | MW21-1D-SS01 | 0-1 | 6 | 68 |
| MW21-1D | 10 | 4000 | MW21-1D-SS02 | 10-11 | 69000 | -65000 |
| MW23-1D | 32 | 1 | MW23-1D-SS03 | 31-32 | 11 | -10 |
| MW24-1D | 87 | 1 | MW24-1D-SS02 | 87-88 | 11 | -10 |
| MW25-2I | 15 | 1 | MW25-2I-SS01 | 14-15 | 57 | -56 |
| MW27-2D | 20 | 1 | MW27-2D-SS02 | 19-20 | 11 | -10 |
| MW27-2D | 30 | 1 | MW27-2D-SS03 | 27-28 | 11 | -10 |
| MW27-3I | 46 | 1 | MW27-3I-SS01 | 45-46 | 11 | -10 |
| MW31-1D | 95-96 | 1 | MW31-1D-SS03 | 95-96 | 11 | -10 |
| MW36-1D | 15 | 1 | MW36-1D-SS02 | 12-14 | 11 | -10 |
| MW38-1I | 10 | 1 | MW38-1I-SS02 | 11-13 | 11 | -10 |
| MW38-1I | 43 | 1 | MW38-1I-SS03 | 41-43 | 11 | -10 |
| PZ03 | 10 | 4.2 | PZ03-SS02 | 9-10 | 3 | 1.2 |
| PZ12 | 0 | 1 | PZ12-SS01 | 0-1 | 12 | -11 |
| PZ14 | 10 | 1 | PZ14-SS03 | 10-12 | 11 | -10 |
| SB04 | 10 | 2.5 | SB04-SS03 | 13-14 | 11 | -8.5 |
| SB07 | 10 | 1.9 | SB07-SS02 | 8-10 | 10 | -8.1 |
| SB07 | 15 | 1 | SB07-SS03 | 10-12 | 11 | -10 |
| SB10 | 10 | 1 | SB10-SS02 | 8-10 | 11 | -10 |
| SB11 | 5 | 1.3 | SB11-SS02 | 5-6 | 10 | -8.7 |
| SB13 | 17 | 1 | SB13-SS03 | 16-17 | 11 | -10 |
| SB17 | 15 | 1 | SB17-SS03 | 13-15 | 11 | -10 |
| SB20 | 10 | 1 | SB20-SS03 | 10-12 | 11 | -10 |
| SB21 | 5 | 1 | SB21-SS02 | 5-7 | 11 | -10 |
| SB21 | 15 | 1 | SB21-SS03 | 13-15 | 11 | -10 |
| SB22 | 0 | 3.6 | SB22-SS01 | 0-1 | 12 | -8.4 |
| SB22 | 15 | 1 | SB22-SS02 | 12-13 | 10 | -9 |
| SB22 | 20 | 1 | SB22-SS03 | 20-22 | 11 | -10 |
| SB23 | 0 | 1 | SB23-SS01 | 0-1 | 12 | -11 |
| SB23 | 5 | 1 | SB23-SS02 | 4-5 | 11 | -10 |
| SB27 | 0 | 5.7 | SB27-SS01 | 0-1 | 11 | -5.3 |
| SB30 | 0 | 6.2 | SB30-SS01 | 0-3 | 3 | 3.2 |
| SB30 | 5 | 590 | SB30-SS02 | 4-5 | 1600 | -1010 |
| SB30 | 10 | 950 | SB30-SS03 | 8-10 | 42000 | -41050 |
| SB31 | 10 | 42 | SB31-SS03 | 8-10 | 56 | -14 |
| SB34 | 15 | 1 | SB34-SS01 | 14-15 | 11 | -10 |
| SB35 | 30 | 1 | SB35-SS01 | 30-32 | 11 | -10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 1 | SB37-SS02 | 7-8 | 11 | -10 |
| SB44 | 21 | 1 | SB44-SS03 | 21-22 | 11 | -10 |
| SB45 | 38 | 1 | SB45-SS01 | 37-38 | 11 | -10 |
| SB46 | 15 | 1 | SB46-SS01 | 14-15 | 11 | -10 |
| SB47 | 45 | 1 | SB47-SS01 | 44-45 | 11 | -10 |
| SB48 | 14 | 1 | SB48-SS01 | 14-15 | 12 | -11 |
| SB49 | 45 | 1 | SB49-SS01 | 44-45 | 11 | -10 |
| SB50 | 40 | 1 | SB50-SS02 | 40-42 | 11 | -10 |
| SB51 | 54 | 1 | SB51-SS01 | 53-54 | 12 | -11 |
| SB52 | 30 | 1 | SB52-SS01 | 30-32 | 11 | -10 |
| SB53 | 30 | 1 | SB53-SS01 | 30-32 | 11 | -10 |
| SB54 | 30 | 1 | SB54-SS01 | 30-31 | 11 | -10 |
| SB55 | 30 | 1 | SB55-SS01 | 30-31 | 11 | -10 |
| SB58 | 30 | 1 | SB58-SS01 | 30-32 | 11 | -10 |
| SB60 | 35 | 1 | SB60-SS02 | 37-38 | 11 | -10 |
| SB61 | 15 | 1 | SB61-SS02 | 14-15 | 11 | -10 |
| SB61 | 30 | 1 | SB61-SS03 | 30-31 | 11 | -10 |
| SB64 | 15 | 1 | SB64-SS02 | 12-14 | 11 | -10 |
| SB65 | 50 | 1 | SB65-SS01 | 48-50 | 11 | -10 |
| SB66 | 25 | 1 | SB66-SS02 | 23-25 | 11 | -10 |
| SB66 | 35 | 1 | SB66-SS03 | 35-37 | 11 | -10 |
| SB67 | 45 | 1 | SB67-SS01 | 43-45 | ND | #VALUE! |
| SB69 | 10 | 1 | SB69-SS02 | 8-10 | ND | #VALUE! |
| SB71 | 45 | 1 | SB71-SS01 | 46-48 | ND | #VALUE! |
| SB73 | 45 | 1 | SB73-SS02 | 45-47 | ND | #VALUE! |
| SB73 | 55 | 1 | SB73-SS03 | 55-57 | ND | #VALUE! |
| SB74 | 48 | 1 | SB74-SS01 | 46-48 | 11 | -10 |
| SB76 | 80 | 1 | SB76-SS04 | 80-82 | 11 | -10 |
| SB76 | 100 | 1 | SB76-SS05 | 100-102 | 11 | -10 |
| SB77 | 60 | 1 | SB77-SS01 | 58-60 | 11 | -10 |

ANALYTICAL RESULTS FOR XYLENES IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 1.2 | MW01-1S-SS02 | 16-17 | 2 | -0.8 |
| MW02-1D | 75-76 | 1 | MW02-1D-SS03 | 75-76 | 11 | -10 |
| MW04-1S | 25 | 1 | MW04-1S-SS03 | 25-30 | 2 | -1 |
| MW09-1D | 15 | 1 | MW09-1D-SS02 | 12-14 | 2 | -1 |
| MW09-3I | 74-75 | 1 | MW09-3I-SS01 | 74-75 | 11 | -10 |
| MW10-1D | 5 | 1 | MW10-1D-SS02 | 7-8 | 2 | -1 |
| MW13-1I | 6.8-7.2 | 1 | MW13-1I-SS02 | 7 | 2 | -1 |
| MW13-1I | 15 | 1 | MW13-1I-SS03 | 13-14 | 11 | -10 |
| MW16-1D | 8 | 1 | MW16-1D-SS02 | 7-8 | 3 | -2 |
| MW20-1D | 10 | 6100 | MW20-1D-SS03 | 10-12 | 12000 | -5900 |
| MW20-1D | 20 | 980 | MW20-1D-SS04 | 19-20 | 19000 | -18020 |
| MW21-1D | 0 | 21 | MW21-1D-SS01 | 0-1 | 23 | -2 |
| MW21-1D | 10 | 15000 | MW21-1D-SS02 | 10-11 | 230000 | -215000 |
| MW23-1D | 32 | 1 | MW23-1D-SS03 | 31-32 | 2 | -1 |
| MW24-1D | 87 | 1 | MW24-1D-SS02 | 87-88 | 2 | -1 |
| MW25-2I | 15 | 16 | MW25-2I-SS01 | 14-15 | 57 | -41 |
| MW27-2D | 20 | 1 | MW27-2D-SS02 | 19-20 | 11 | -10 |
| MW27-2D | 30 | 1 | MW27-2D-SS03 | 27-28 | 3 | -2 |
| MW27-3I | 46 | 1 | MW27-3I-SS01 | 45-46 | 11 | -10 |
| MW31-1D | 95-96 | 1 | MW31-1D-SS03 | 95-96 | 11 | -10 |
| MW36-1D | 15 | 1 | MW36-1D-SS02 | 12-14 | 11 | -10 |
| MW38-1I | 10 | 1 | MW38-1I-SS02 | 11-13 | 11 | -10 |
| MW38-1I | 43 | 1 | MW38-1I-SS03 | 41-43 | 11 | -10 |
| PZ03 | 10 | 6.8 | PZ03-SS02 | 9-10 | 8 | -1.2 |
| PZ12 | 0 | 1 | PZ12-SS01 | 0-1 | 2 | -1 |
| PZ14 | 10 | 1 | PZ14-SS03 | 10-12 | 2 | -1 |
| SB04 | 10 | 6.5 | SB04-SS03 | 13-14 | 2 | 4.5 |
| SB07 | 10 | 4.1 | SB07-SS02 | 8-10 | 10 | -5.9 |
| SB07 | 15 | 1 | SB07-SS03 | 10-12 | 2 | -1 |
| SB10 | 10 | 1.7 | SB10-SS02 | 8-10 | 3 | -1.3 |
| SB11 | 5 | 2.2 | SB11-SS02 | 5-6 | 3 | -0.8 |
| SB13 | 17 | 1 | SB13-SS03 | 16-17 | 2 | -1 |
| SB17 | 15 | 1 | SB17-SS03 | 13-15 | 2 | -1 |
| SB20 | 10 | 1 | SB20-SS03 | 10-12 | 2 | -1 |
| SB21 | 5 | 1 | SB21-SS02 | 5-7 | 11 | -10 |
| SB21 | 15 | 1.4 | SB21-SS03 | 13-15 | 11 | -9.6 |
| SB22 | 0 | 1 | SB22-SS01 | 0-1 | 9 | -8 |
| SB22 | 15 | 1 | SB22-SS02 | 12-13 | 10 | -9 |
| SB22 | 20 | 1 | SB22-SS03 | 20-22 | 11 | -10 |
| SB23 | 0 | 1 | SB23-SS01 | 0-1 | 11 | -10 |
| SB23 | 5 | 1 | SB23-SS02 | 4-5 | 2 | -1 |
| SB27 | 0 | 16.2 | SB27-SS01 | 0-1 | 2 | 14.2 |
| SB30 | 0 | 3.9 | SB30-SS01 | 0-3 | 4 | -0.1 |
| SB30 | 5 | 660 | SB30-SS02 | 4-5 | 2700 | -2040 |
| SB30 | 10 | 2500 | SB30-SS03 | 8-10 | 130000 | -127500 |
| SB31 | 10 | 31 | SB31-SS03 | 8-10 | 56 | -25 |
| SB34 | 15 | 1 | SB34-SS01 | 14-15 | 11 | -10 |
| SB35 | 30 | 1 | SB35-SS01 | 30-32 | 11 | -10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 1 | SB37-SS02 | 7-8 | 2 | -1 |
| SB44 | 21 | 1 | SB44-SS03 | 21-22 | 11 | -10 |
| SB45 | 38 | 1 | SB45-SS01 | 37-38 | 11 | -10 |
| SB46 | 15 | 1 | SB46-SS01 | 14-15 | 11 | -10 |
| SB47 | 45 | 1 | SB47-SS01 | 44-45 | 11 | -10 |
| SB48 | 14 | 1 | SB48-SS01 | 14-15 | 12 | -11 |
| SB49 | 45 | 1 | SB49-SS01 | 44-45 | 11 | -10 |
| SB50 | 40 | 1 | SB50-SS02 | 40-42 | 11 | -10 |
| SB51 | 54 | 1 | SB51-SS01 | 53-54 | 12 | -11 |
| SB52 | 30 | 1 | SB52-SS01 | 30-32 | 11 | -10 |
| SB53 | 30 | 1 | SB53-SS01 | 30-32 | 11 | -10 |
| SB54 | 30 | 1 | SB54-SS01 | 30-31 | 11 | -10 |
| SB55 | 30 | 1 | SB55-SS01 | 30-31 | 11 | -10 |
| SB58 | 30 | 1 | SB58-SS01 | 30-32 | 11 | -10 |
| SB60 | 35 | 1 | SB60-SS02 | 37-38 | 11 | -10 |
| SB61 | 15 | 1 | SB61-SS02 | 14-15 | 11 | -10 |
| SB61 | 30 | 1 | SB61-SS03 | 30-31 | 11 | -10 |
| SB64 | 15 | 1 | SB64-SS02 | 12-14 | 5 | -4 |
| SB65 | 50 | 1 | SB65-SS01 | 48-50 | 7 | -6 |
| SB66 | 25 | 1 | SB66-SS02 | 23-25 | 11 | -10 |
| SB66 | 35 | 1 | SB66-SS03 | 35-37 | 11 | -10 |
| SB67 | 45 | 1 | SB67-SS01 | 43-45 | ND | #VALUE! |
| SB69 | 10 | 1 | SB69-SS02 | 8-10 | ND | #VALUE! |
| SB71 | 45 | 1 | SB71-SS01 | 46-48 | ND | #VALUE! |
| SB73 | 45 | 1 | SB73-SS02 | 45-47 | ND | #VALUE! |
| SB73 | 55 | 1 | SB73-SS03 | 55-57 | ND | #VALUE! |
| SB74 | 48 | 1 | SB74-SS01 | 46-48 | 11 | -10 |
| SB76 | 80 | 1 | SB76-SS04 | 80-82 | 11 | -10 |
| SB76 | 100 | 1 | SB76-SS05 | 100-102 | 11 | -10 |
| SB77 | 60 | 1 | SB77-SS01 | 58-60 | 11 | -10 |

ANALYTICAL RESULTS FOR CHLOROFORM IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 0.5 | MW01-1S-SS02 | 16-17 | 11 | -10.5 |
| MW02-1D | 75-76 | 0.5 | MW02-1D-SS03 | 75-76 | 11 | -10.5 |
| MW04-1S | 25 | 0.5 | MW04-1S-SS03 | 25-30 | 10 | -9.5 |
| MW09-1D | 15 | 0.5 | MW09-1D-SS02 | 12-14 | 11 | -10.5 |
| MW09-3I | 74-75 | 0.5 | MW09-3I-SS01 | 74-75 | 11 | -10.5 |
| MW10-1D | 5 | 0.5 | MW10-1D-SS02 | 7-8 | 11 | -10.5 |
| MW13-1I | 6.8-7.2 | 0.5 | MW13-1I-SS02 | 7 | 10 | -9.5 |
| MW13-1I | 15 | 0.5 | MW13-1I-SS03 | 13-14 | 11 | -10.5 |
| MW16-1D | 8 | 0.5 | MW16-1D-SS02 | 7-8 | 11 | -10.5 |
| MW20-1D | 10 | 0.5 | MW20-1D-SS03 | 10-12 | 27000 | -26999.5 |
| MW20-1D | 20 | 0.5 | MW20-1D-SS04 | 19-20 | 27000 | -26999.5 |
| MW21-1D | 0 | 0.5 | MW21-1D-SS01 | 0-1 | 11 | -10.5 |
| MW21-1D | 10 | 0.5 | MW21-1D-SS02 | 10-11 | 26000 | -25999.5 |
| MW23-1D | 32 | 0.5 | MW23-1D-SS03 | 31-32 | 11 | -10.5 |
| MW24-1D | 87 | 0.5 | MW24-1D-SS02 | 87-88 | 11 | -10.5 |
| MW25-2I | 15 | 0.5 | MW25-2I-SS01 | 14-15 | 57 | -56.5 |
| MW27-2D | 20 | 0.5 | MW27-2D-SS02 | 19-20 | 11 | -10.5 |
| MW27-2D | 30 | 0.5 | MW27-2D-SS03 | 27-28 | 11 | -10.5 |
| MW27-3I | 46 | 0.5 | MW27-3I-SS01 | 45-46 | 11 | -10.5 |
| MW31-1D | 95-96 | 0.5 | MW31-1D-SS03 | 95-96 | 11 | -10.5 |
| MW36-1D | 15 | 0.5 | MW36-1D-SS02 | 12-14 | 11 | -10.5 |
| MW38-1I | 10 | 0.5 | MW38-1I-SS02 | 11-13 | 11 | -10.5 |
| MW38-1I | 43 | 0.5 | MW38-1I-SS03 | 41-43 | 11 | -10.5 |
| PZ03 | 10 | 0.5 | PZ03-SS02 | 9-10 | 10 | -9.5 |
| PZ12 | 0 | 0.5 | PZ12-SS01 | 0-1 | 12 | -11.5 |
| PZ14 | 10 | 0.5 | PZ14-SS03 | 10-12 | 11 | -10.5 |
| SB04 | 10 | 0.5 | SB04-SS03 | 13-14 | 11 | -10.5 |
| SB07 | 10 | 0.55 | SB07-SS02 | 8-10 | 10 | -9.45 |
| SB07 | 15 | 0.5 | SB07-SS03 | 10-12 | 11 | -10.5 |
| SB10 | 10 | 0.5 | SB10-SS02 | 8-10 | 11 | -10.5 |
| SB11 | 5 | 0.5 | SB11-SS02 | 5-6 | 10 | -9.5 |
| SB13 | 17 | 0.5 | SB13-SS03 | 16-17 | 11 | -10.5 |
| SB17 | 15 | 0.5 | SB17-SS03 | 13-15 | 11 | -10.5 |
| SB20 | 10 | 0.5 | SB20-SS03 | 10-12 | 11 | -10.5 |
| SB21 | 5 | 0.5 | SB21-SS02 | 5-7 | 11 | -10.5 |
| SB21 | 15 | 0.5 | SB21-SS03 | 13-15 | 11 | -10.5 |
| SB22 | 0 | 0.5 | SB22-SS01 | 0-1 | 12 | -11.5 |
| SB22 | 15 | 0.5 | SB22-SS02 | 12-13 | 10 | -9.5 |
| SB22 | 20 | 0.5 | SB22-SS03 | 20-22 | 11 | -10.5 |
| SB23 | 0 | 0.5 | SB23-SS01 | 0-1 | 12 | -11.5 |
| SB23 | 5 | 0.5 | SB23-SS02 | 4-5 | 11 | -10.5 |
| SB27 | 0 | 1.4 | SB27-SS01 | 0-1 | 11 | -9.6 |
| SB30 | 0 | 0.5 | SB30-SS01 | 0-3 | 11 | -10.5 |
| SB30 | 5 | 0.5 | SB30-SS02 | 4-5 | 1500 | -1499.5 |
| SB30 | 10 | 0.5 | SB30-SS03 | 8-10 | 5400 | -5399.5 |
| SB31 | 10 | 0.5 | SB31-SS03 | 8-10 | 56 | -55.5 |
| SB34 | 15 | 0.5 | SB34-SS01 | 14-15 | 11 | -10.5 |
| SB35 | 30 | 0.5 | SB35-SS01 | 30-32 | 11 | -10.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 0.5 | SB37-SS02 | 7-8 | 11 | -10.5 |
| SB44 | 21 | 0.5 | SB44-SS03 | 21-22 | 11 | -10.5 |
| SB45 | 38 | 0.5 | SB45-SS01 | 37-38 | 11 | -10.5 |
| SB46 | 15 | 0.5 | SB46-SS01 | 14-15 | 11 | -10.5 |
| SB47 | 45 | 0.5 | SB47-SS01 | 44-45 | 11 | -10.5 |
| SB48 | 14 | 0.5 | SB48-SS01 | 14-15 | 12 | -11.5 |
| SB49 | 45 | 0.5 | SB49-SS01 | 44-45 | 11 | -10.5 |
| SB50 | 40 | 0.5 | SB50-SS02 | 40-42 | 11 | -10.5 |
| SB51 | 54 | 0.5 | SB51-SS01 | 53-54 | 12 | -11.5 |
| SB52 | 30 | 0.5 | SB52-SS01 | 30-32 | 11 | -10.5 |
| SB53 | 30 | 0.5 | SB53-SS01 | 30-32 | 11 | -10.5 |
| SB54 | 30 | 0.5 | SB54-SS01 | 30-31 | 11 | -10.5 |
| SB55 | 30 | 0.5 | SB55-SS01 | 30-31 | 11 | -10.5 |
| SB58 | 30 | 0.5 | SB58-SS01 | 30-32 | 11 | -10.5 |
| SB60 | 35 | 0.5 | SB60-SS02 | 37-38 | 11 | -10.5 |
| SB61 | 15 | 0.5 | SB61-SS02 | 14-15 | 11 | -10.5 |
| SB61 | 30 | 0.5 | SB61-SS03 | 30-31 | 11 | -10.5 |
| SB64 | 15 | 0.5 | SB64-SS02 | 12-14 | 11 | -10.5 |
| SB65 | 50 | 0.5 | SB65-SS01 | 48-50 | 11 | -10.5 |
| SB66 | 25 | 0.5 | SB66-SS02 | 23-25 | 11 | -10.5 |
| SB66 | 35 | 0.5 | SB66-SS03 | 35-37 | 11 | -10.5 |
| SB67 | 45 | 0.5 | SB67-SS01 | 43-45 | 11 | -10.5 |
| SB69 | 10 | 0.5 | SB69-SS02 | 8-10 | 11 | -10.5 |
| SB71 | 45 | 0.5 | SB71-SS01 | 46-48 | 11 | -10.5 |
| SB73 | 45 | 0.5 | SB73-SS02 | 45-47 | 11 | -10.5 |
| SB73 | 55 | 0.5 | SB73-SS03 | 55-57 | 11 | -10.5 |
| SB74 | 48 | 0.5 | SB74-SS01 | 46-48 | 11 | -10.5 |
| SB76 | 80 | 0.5 | SB76-SS04 | 80-82 | 11 | -10.5 |
| SB76 | 100 | 0.5 | SB76-SS05 | 100-102 | 11 | -10.5 |
| SB77 | 60 | 0.5 | SB77-SS01 | 58-60 | 11 | -10.5 |

ANALYTICAL RESULTS FOR 1,1,1-TCA IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 0.5 | MW01-1S-SS02 | 16-17 | 11 | -10.5 |
| MW02-1D | 75-76 | 0.5 | MW02-1D-SS03 | 75-76 | 11 | -10.5 |
| MW04-1S | 25 | 0.5 | MW04-1S-SS03 | 25-30 | 10 | -9.5 |
| MW09-1D | 15 | 0.5 | MW09-1D-SS02 | 12-14 | 11 | -10.5 |
| MW09-3I | 74-75 | 0.5 | MW09-3I-SS01 | 74-75 | 11 | -10.5 |
| MW10-1D | 5 | 0.5 | MW10-1D-SS02 | 7-8 | 11 | -10.5 |
| MW13-1I | 6.8-7.2 | 0.5 | MW13-1I-SS02 | 7 | 10 | -9.5 |
| MW13-1I | 15 | 0.5 | MW13-1I-SS03 | 13-14 | 11 | -10.5 |
| MW16-1D | 8 | 0.5 | MW16-1D-SS02 | 7-8 | 11 | -10.5 |
| MW20-1D | 10 | 0.5 | MW20-1D-SS03 | 10-12 | 27000 | -26999.5 |
| MW20-1D | 20 | 0.5 | MW20-1D-SS04 | 19-20 | 27000 | -26999.5 |
| MW21-1D | 0 | 0.5 | MW21-1D-SS01 | 0-1 | 11 | -10.5 |
| MW21-1D | 10 | 0.5 | MW21-1D-SS02 | 10-11 | 26000 | -25999.5 |
| MW23-1D | 32 | 0.5 | MW23-1D-SS03 | 31-32 | 11 | -10.5 |
| MW24-1D | 87 | 0.5 | MW24-1D-SS02 | 87-88 | 11 | -10.5 |
| MW25-2I | 15 | 0.5 | MW25-2I-SS01 | 14-15 | 57 | -56.5 |
| MW27-2D | 20 | 0.5 | MW27-2D-SS02 | 19-20 | 11 | -10.5 |
| MW27-2D | 30 | 0.5 | MW27-2D-SS03 | 27-28 | 11 | -10.5 |
| MW27-3I | 46 | 0.5 | MW27-3I-SS01 | 45-46 | 11 | -10.5 |
| MW31-1D | 95-96 | 0.5 | MW31-1D-SS03 | 95-96 | 11 | -10.5 |
| MW36-1D | 15 | 0.5 | MW36-1D-SS02 | 12-14 | 11 | -10.5 |
| MW38-1I | 10 | 0.5 | MW38-1I-SS02 | 11-13 | 11 | -10.5 |
| MW38-1I | 43 | 0.7 | MW38-1I-SS03 | 41-43 | 11 | -10.3 |
| PZ03 | 10 | 0.5 | PZ03-SS02 | 9-10 | 10 | -9.5 |
| PZ12 | 0 | 0.5 | PZ12-SS01 | 0-1 | 12 | -11.5 |
| PZ14 | 10 | 0.5 | PZ14-SS03 | 10-12 | 11 | -10.5 |
| SB04 | 10 | 0.5 | SB04-SS03 | 13-14 | 11 | -10.5 |
| SB07 | 10 | 0.5 | SB07-SS02 | 8-10 | 10 | -9.5 |
| SB07 | 15 | 0.5 | SB07-SS03 | 10-12 | 11 | -10.5 |
| SB10 | 10 | 0.57 | SB10-SS02 | 8-10 | 11 | -10.43 |
| SB11 | 5 | 0.5 | SB11-SS02 | 5-6 | 10 | -9.5 |
| SB13 | 17 | 0.5 | SB13-SS03 | 16-17 | 11 | -10.5 |
| SB17 | 15 | 0.5 | SB17-SS03 | 13-15 | 11 | -10.5 |
| SB20 | 10 | 0.5 | SB20-SS03 | 10-12 | 11 | -10.5 |
| SB21 | 5 | 0.5 | SB21-SS02 | 5-7 | 11 | -10.5 |
| SB21 | 15 | 0.5 | SB21-SS03 | 13-15 | 11 | -10.5 |
| SB22 | 0 | 0.5 | SB22-SS01 | 0-1 | 12 | -11.5 |
| SB22 | 15 | 0.5 | SB22-SS02 | 12-13 | 10 | -9.5 |
| SB22 | 20 | 0.5 | SB22-SS03 | 20-22 | 11 | -10.5 |
| SB23 | 0 | 0.5 | SB23-SS01 | 0-1 | 12 | -11.5 |
| SB23 | 5 | 0.5 | SB23-SS02 | 4-5 | 11 | -10.5 |
| SB27 | 0 | 0.5 | SB27-SS01 | 0-1 | 11 | -10.5 |
| SB30 | 0 | 0.5 | SB30-SS01 | 0-3 | 11 | -10.5 |
| SB30 | 5 | 0.5 | SB30-SS02 | 4-5 | 1500 | -1499.5 |
| SB30 | 10 | 0.5 | SB30-SS03 | 8-10 | 5400 | -5399.5 |
| SB31 | 10 | 0.5 | SB31-SS03 | 8-10 | 56 | -55.5 |
| SB34 | 15 | 0.5 | SB34-SS01 | 14-15 | 11 | -10.5 |
| SB35 | 30 | 0.5 | SB35-SS01 | 30-32 | 11 | -10.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 0.5 | SB37-SS02 | 7-8 | 11 | -10.5 |
| SB44 | 21 | 0.5 | SB44-SS03 | 21-22 | 11 | -10.5 |
| SB45 | 38 | 0.5 | SB45-SS01 | 37-38 | 11 | -10.5 |
| SB46 | 15 | 0.5 | SB46-SS01 | 14-15 | 11 | -10.5 |
| SB47 | 45 | 0.5 | SB47-SS01 | 44-45 | 11 | -10.5 |
| SB48 | 14 | 0.5 | SB48-SS01 | 14-15 | 12 | -11.5 |
| SB49 | 45 | 0.5 | SB49-SS01 | 44-45 | 11 | -10.5 |
| SB50 | 40 | 0.5 | SB50-SS02 | 40-42 | 11 | -10.5 |
| SB51 | 54 | 0.5 | SB51-SS01 | 53-54 | 12 | -11.5 |
| SB52 | 30 | 0.5 | SB52-SS01 | 30-32 | 11 | -10.5 |
| SB53 | 30 | 0.5 | SB53-SS01 | 30-32 | 11 | -10.5 |
| SB54 | 30 | 0.5 | SB54-SS01 | 30-31 | 11 | -10.5 |
| SB55 | 30 | 0.5 | SB55-SS01 | 30-31 | 11 | -10.5 |
| SB58 | 30 | 0.5 | SB58-SS01 | 30-32 | 11 | -10.5 |
| SB60 | 35 | 0.5 | SB60-SS02 | 37-38 | 11 | -10.5 |
| SB61 | 15 | 0.5 | SB61-SS02 | 14-15 | 11 | -10.5 |
| SB61 | 30 | 0.5 | SB61-SS03 | 30-31 | 11 | -10.5 |
| SB64 | 15 | 0.5 | SB64-SS02 | 12-14 | 11 | -10.5 |
| SB65 | 50 | 0.5 | SB65-SS01 | 48-50 | 11 | -10.5 |
| SB66 | 25 | 0.5 | SB66-SS02 | 23-25 | 11 | -10.5 |
| SB66 | 35 | 0.7 | SB66-SS03 | 35-37 | 11 | -10.3 |
| SB67 | 45 | 0.5 | SB67-SS01 | 43-45 | ND | #VALUE! |
| SB69 | 10 | 0.5 | SB69-SS02 | 8-10 | ND | #VALUE! |
| SB71 | 45 | 0.5 | SB71-SS01 | 46-48 | ND | #VALUE! |
| SB73 | 45 | 0.5 | SB73-SS02 | 45-47 | 2 | -1.5 |
| SB73 | 55 | 0.5 | SB73-SS03 | 55-57 | 2 | -1.5 |
| SB74 | 48 | 0.5 | SB74-SS01 | 46-48 | 2 | -1.5 |
| SB76 | 80 | 0.5 | SB76-SS04 | 80-82 | 11 | -10.5 |
| SB76 | 100 | 0.5 | SB76-SS05 | 100-102 | 11 | -10.5 |
| SB77 | 60 | 0.5 | SB77-SS01 | 58-60 | 11 | -10.5 |

ANALYTICAL RESULTS FOR CARBON TETRACHLORIDE IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 0.5 | MW01-1S-SS02 | 16-17 | 11 | -10.5 |
| MW02-1D | 75-76 | 0.5 | MW02-1D-SS03 | 75-76 | 11 | -10.5 |
| MW04-1S | 25 | 0.5 | MW04-1S-SS03 | 25-30 | 10 | -9.5 |
| MW09-1D | 15 | 0.5 | MW09-1D-SS02 | 12-14 | 11 | -10.5 |
| MW09-3I | 74-75 | 0.5 | MW09-3I-SS01 | 74-75 | 11 | -10.5 |
| MW10-1D | 5 | 0.5 | MW10-1D-SS02 | 7-8 | 11 | -10.5 |
| MW13-1I | 6.8-7.2 | 0.5 | MW13-1I-SS02 | 7 | 10 | -9.5 |
| MW13-1I | 15 | 0.5 | MW13-1I-SS03 | 13-14 | 11 | -10.5 |
| MW16-1D | 8 | 0.5 | MW16-1D-SS02 | 7-8 | 11 | -10.5 |
| MW20-1D | 10 | 0.5 | MW20-1D-SS03 | 10-12 | 27000 | -26999.5 |
| MW20-1D | 20 | 0.5 | MW20-1D-SS04 | 19-20 | 27000 | -26999.5 |
| MW21-1D | 0 | 0.5 | MW21-1D-SS01 | 0-1 | 11 | -10.5 |
| MW21-1D | 10 | 0.5 | MW21-1D-SS02 | 10-11 | 26000 | -25999.5 |
| MW23-1D | 32 | 0.5 | MW23-1D-SS03 | 31-32 | 11 | -10.5 |
| MW24-1D | 87 | 0.5 | MW24-1D-SS02 | 87-88 | 11 | -10.5 |
| MW25-2I | 15 | 0.5 | MW25-2I-SS01 | 14-15 | 57 | -56.5 |
| MW27-2D | 20 | 0.5 | MW27-2D-SS02 | 19-20 | 11 | -10.5 |
| MW27-2D | 30 | 0.5 | MW27-2D-SS03 | 27-28 | 11 | -10.5 |
| MW27-3I | 46 | 0.5 | MW27-3I-SS01 | 45-46 | 11 | -10.5 |
| MW31-1D | 95-96 | 0.5 | MW31-1D-SS03 | 95-96 | 11 | -10.5 |
| MW36-1D | 15 | 0.5 | MW36-1D-SS02 | 12-14 | 11 | -10.5 |
| MW38-1I | 10 | 0.5 | MW38-1I-SS02 | 11-13 | 11 | -10.5 |
| MW38-1I | 43 | 0.5 | MW38-1I-SS03 | 41-43 | 11 | -10.5 |
| PZ03 | 10 | 0.5 | PZ03-SS02 | 9-10 | 10 | -9.5 |
| PZ12 | 0 | 0.5 | PZ12-SS01 | 0-1 | 12 | -11.5 |
| PZ14 | 10 | 0.5 | PZ14-SS03 | 10-12 | 11 | -10.5 |
| SB04 | 10 | 0.5 | SB04-SS03 | 13-14 | 11 | -10.5 |
| SB07 | 10 | 0.5 | SB07-SS02 | 8-10 | 10 | -9.5 |
| SB07 | 15 | 0.5 | SB07-SS03 | 10-12 | 11 | -10.5 |
| SB10 | 10 | 0.5 | SB10-SS02 | 8-10 | 11 | -10.5 |
| SB11 | 5 | 0.5 | SB11-SS02 | 5-6 | 10 | -9.5 |
| SB13 | 17 | 0.5 | SB13-SS03 | 16-17 | 11 | -10.5 |
| SB17 | 15 | 0.5 | SB17-SS03 | 13-15 | 11 | -10.5 |
| SB20 | 10 | 0.5 | SB20-SS03 | 10-12 | 11 | -10.5 |
| SB21 | 5 | 0.5 | SB21-SS02 | 5-7 | 11 | -10.5 |
| SB21 | 15 | 0.5 | SB21-SS03 | 13-15 | 11 | -10.5 |
| SB22 | 0 | 0.5 | SB22-SS01 | 0-1 | 12 | -11.5 |
| SB22 | 15 | 0.5 | SB22-SS02 | 12-13 | 10 | -9.5 |
| SB22 | 20 | 0.5 | SB22-SS03 | 20-22 | 11 | -10.5 |
| SB23 | 0 | 0.5 | SB23-SS01 | 0-1 | 12 | -11.5 |
| SB23 | 5 | 0.5 | SB23-SS02 | 4-5 | 11 | -10.5 |
| SB27 | 0 | 0.5 | SB27-SS01 | 0-1 | 11 | -10.5 |
| SB30 | 0 | 0.5 | SB30-SS01 | 0-3 | 11 | -10.5 |
| SB30 | 5 | 0.5 | SB30-SS02 | 4-5 | 1500 | -1499.5 |
| SB30 | 10 | 0.5 | SB30-SS03 | 8-10 | 5400 | -5399.5 |
| SB31 | 10 | 0.5 | SB31-SS03 | 8-10 | 56 | -55.5 |
| SB34 | 15 | 0.5 | SB34-SS01 | 14-15 | 11 | -10.5 |
| SB35 | 30 | 0.5 | SB35-SS01 | 30-32 | 11 | -10.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 0.5 | SB37-SS02 | 7-8 | 11 | -10.5 |
| SB44 | 21 | 0.5 | SB44-SS03 | 21-22 | 11 | -10.5 |
| SB45 | 38 | 0.5 | SB45-SS01 | 37-38 | 11 | -10.5 |
| SB46 | 15 | 0.5 | SB46-SS01 | 14-15 | 11 | -10.5 |
| SB47 | 45 | 0.5 | SB47-SS01 | 44-45 | 11 | -10.5 |
| SB48 | 14 | 0.5 | SB48-SS01 | 14-15 | 12 | -11.5 |
| SB49 | 45 | 0.5 | SB49-SS01 | 44-45 | 11 | -10.5 |
| SB50 | 40 | 0.5 | SB50-SS02 | 40-42 | 11 | -10.5 |
| SB51 | 54 | 0.5 | SB51-SS01 | 53-54 | 12 | -11.5 |
| SB52 | 30 | 0.5 | SB52-SS01 | 30-32 | 11 | -10.5 |
| SB53 | 30 | 0.5 | SB53-SS01 | 30-32 | 11 | -10.5 |
| SB54 | 30 | 0.5 | SB54-SS01 | 30-31 | 11 | -10.5 |
| SB55 | 30 | 0.5 | SB55-SS01 | 30-31 | 11 | -10.5 |
| SB58 | 30 | 0.5 | SB58-SS01 | 30-32 | 11 | -10.5 |
| SB60 | 35 | 0.5 | SB60-SS02 | 37-38 | 11 | -10.5 |
| SB61 | 15 | 0.5 | SB61-SS02 | 14-15 | 11 | -10.5 |
| SB61 | 30 | 0.5 | SB61-SS03 | 30-31 | 11 | -10.5 |
| SB64 | 15 | 0.5 | SB64-SS02 | 12-14 | 11 | -10.5 |
| SB65 | 50 | 0.5 | SB65-SS01 | 48-50 | 11 | -10.5 |
| SB66 | 25 | 0.5 | SB66-SS02 | 23-25 | 11 | -10.5 |
| SB66 | 35 | 0.5 | SB66-SS03 | 35-37 | 11 | -10.5 |
| SB67 | 45 | 0.5 | SB67-SS01 | 43-45 | ND | #VALUE! |
| SB69 | 10 | 0.5 | SB69-SS02 | 8-10 | ND | #VALUE! |
| SB71 | 45 | 0.5 | SB71-SS01 | 46-48 | ND | #VALUE! |
| SB73 | 45 | 0.5 | SB73-SS02 | 45-47 | ND | #VALUE! |
| SB73 | 55 | 0.5 | SB73-SS03 | 55-57 | ND | #VALUE! |
| SB74 | 48 | 0.5 | SB74-SS01 | 46-48 | 11 | -10.5 |
| SB76 | 80 | 1.6 | SB76-SS04 | 80-82 | 11 | -9.4 |
| SB76 | 100 | 0.5 | SB76-SS05 | 100-102 | 11 | -10.5 |
| SB77 | 60 | 0.5 | SB77-SS01 | 58-60 | 11 | -10.5 |

ANALYTICAL RESULTS FOR TCE IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 0.5 | MW01-1S-SS02 | 16-17 | 11 | -10.5 |
| MW02-1D | 75-76 | 0.5 | MW02-1D-SS03 | 75-76 | 11 | -10.5 |
| MW04-1S | 25 | 0.5 | MW04-1S-SS03 | 25-30 | 10 | -9.5 |
| MW09-1D | 15 | 0.5 | MW09-1D-SS02 | 12-14 | 11 | -10.5 |
| MW09-3I | 74-75 | 0.5 | MW09-3I-SS01 | 74-75 | 11 | -10.5 |
| MW10-1D | 5 | 0.5 | MW10-1D-SS02 | 7-8 | 11 | -10.5 |
| MW13-1I | 6.8-7.2 | 0.5 | MW13-1I-SS02 | 7 | 10 | -9.5 |
| MW13-1I | 15 | 0.5 | MW13-1I-SS03 | 13-14 | 11 | -10.5 |
| MW16-1D | 8 | 0.5 | MW16-1D-SS02 | 7-8 | 11 | -10.5 |
| MW20-1D | 10 | 0.5 | MW20-1D-SS03 | 10-12 | 27000 | -26999.5 |
| MW20-1D | 20 | 0.5 | MW20-1D-SS04 | 19-20 | 27000 | -26999.5 |
| MW21-1D | 0 | 0.5 | MW21-1D-SS01 | 0-1 | 11 | -10.5 |
| MW21-1D | 10 | 0.5 | MW21-1D-SS02 | 10-11 | 26000 | -25999.5 |
| MW23-1D | 32 | 0.5 | MW23-1D-SS03 | 31-32 | 11 | -10.5 |
| MW24-1D | 87 | 0.5 | MW24-1D-SS02 | 87-88 | 11 | -10.5 |
| MW25-2I | 15 | 0.5 | MW25-2I-SS01 | 14-15 | 57 | -56.5 |
| MW27-2D | 20 | 0.5 | MW27-2D-SS02 | 19-20 | 11 | -10.5 |
| MW27-2D | 30 | 0.5 | MW27-2D-SS03 | 27-28 | 11 | -10.5 |
| MW27-3I | 46 | 0.5 | MW27-3I-SS01 | 45-46 | 11 | -10.5 |
| MW31-1D | 95-96 | 0.5 | MW31-1D-SS03 | 95-96 | 11 | -10.5 |
| MW36-1D | 15 | 0.5 | MW36-1D-SS02 | 12-14 | 11 | -10.5 |
| MW38-1I | 10 | 2.1 | MW38-1I-SS02 | 11-13 | 2 | 0.1 |
| MW38-1I | 43 | 1.8 | MW38-1I-SS03 | 41-43 | 11 | -9.2 |
| PZ03 | 10 | 0.5 | PZ03-SS02 | 9-10 | 10 | -9.5 |
| PZ12 | 0 | 0.5 | PZ12-SS01 | 0-1 | 12 | -11.5 |
| PZ14 | 10 | 0.5 | PZ14-SS03 | 10-12 | 11 | -10.5 |
| SB04 | 10 | 0.5 | SB04-SS03 | 13-14 | 11 | -10.5 |
| SB07 | 10 | 0.5 | SB07-SS02 | 8-10 | 10 | -9.5 |
| SB07 | 15 | 0.5 | SB07-SS03 | 10-12 | 11 | -10.5 |
| SB10 | 10 | 0.5 | SB10-SS02 | 8-10 | 11 | -10.5 |
| SB11 | 5 | 0.5 | SB11-SS02 | 5-6 | 10 | -9.5 |
| SB13 | 17 | 0.5 | SB13-SS03 | 16-17 | 11 | -10.5 |
| SB17 | 15 | 0.5 | SB17-SS03 | 13-15 | 11 | -10.5 |
| SB20 | 10 | 0.5 | SB20-SS03 | 10-12 | 11 | -10.5 |
| SB21 | 5 | 0.5 | SB21-SS02 | 5-7 | 11 | -10.5 |
| SB21 | 15 | 0.5 | SB21-SS03 | 13-15 | 11 | -10.5 |
| SB22 | 0 | 0.5 | SB22-SS01 | 0-1 | 12 | -11.5 |
| SB22 | 15 | 0.5 | SB22-SS02 | 12-13 | 10 | -9.5 |
| SB22 | 20 | 0.5 | SB22-SS03 | 20-22 | 11 | -10.5 |
| SB23 | 0 | 0.5 | SB23-SS01 | 0-1 | 12 | -11.5 |
| SB23 | 5 | 0.5 | SB23-SS02 | 4-5 | 11 | -10.5 |
| SB27 | 0 | 0.5 | SB27-SS01 | 0-1 | 11 | -10.5 |
| SB30 | 0 | 0.5 | SB30-SS01 | 0-3 | 11 | -10.5 |
| SB30 | 5 | 0.5 | SB30-SS02 | 4-5 | 1500 | -1499.5 |
| SB30 | 10 | 0.5 | SB30-SS03 | 8-10 | 5400 | -5399.5 |
| SB31 | 10 | 0.5 | SB31-SS03 | 8-10 | 56 | -55.5 |
| SB34 | 15 | 0.86 | SB34-SS01 | 14-15 | 11 | -10.14 |
| SB35 | 30 | 0.66 | SB35-SS01 | 30-32 | 11 | -10.34 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 0.5 | SB37-SS02 | 7-8 | 11 | -10.5 |
| SB44 | 21 | 0.72 | SB44-SS03 | 21-22 | 11 | -10.28 |
| SB45 | 38 | 0.5 | SB45-SS01 | 37-38 | 11 | -10.5 |
| SB46 | 15 | 0.5 | SB46-SS01 | 14-15 | 11 | -10.5 |
| SB47 | 45 | 0.31 | SB47-SS01 | 44-45 | 11 | -10.69 |
| SB48 | 14 | 0.5 | SB48-SS01 | 14-15 | 12 | -11.5 |
| SB49 | 45 | 0.5 | SB49-SS01 | 44-45 | 11 | -10.5 |
| SB50 | 40 | 0.5 | SB50-SS02 | 40-42 | 11 | -10.5 |
| SB51 | 54 | 0.5 | SB51-SS01 | 53-54 | 12 | -11.5 |
| SB52 | 30 | 0.5 | SB52-SS01 | 30-32 | 11 | -10.5 |
| SB53 | 30 | 0.5 | SB53-SS01 | 30-32 | 11 | -10.5 |
| SB54 | 30 | 0.5 | SB54-SS01 | 30-31 | 11 | -10.5 |
| SB55 | 30 | 0.5 | SB55-SS01 | 30-31 | 11 | -10.5 |
| SB58 | 30 | 0.5 | SB58-SS01 | 30-32 | 11 | -10.5 |
| SB60 | 35 | 0.42 | SB60-SS02 | 37-38 | 11 | -10.58 |
| SB61 | 15 | 0.5 | SB61-SS02 | 14-15 | 11 | -10.5 |
| SB61 | 30 | 0.5 | SB61-SS03 | 30-31 | 11 | -10.5 |
| SB64 | 15 | 0.5 | SB64-SS02 | 12-14 | 11 | -10.5 |
| SB65 | 50 | 0.5 | SB65-SS01 | 48-50 | 11 | -10.5 |
| SB66 | 25 | 2.9 | SB66-SS02 | 23-25 | 11 | -8.1 |
| SB66 | 35 | 3.3 | SB66-SS03 | 35-37 | 11 | -7.7 |
| SB67 | 45 | 3 | SB67-SS01 | 43-45 | 2 | 1 |
| SB69 | 10 | 0.5 | SB69-SS02 | 8-10 | ND | #VALUE! |
| SB71 | 45 | 0.5 | SB71-SS01 | 46-48 | ND | #VALUE! |
| SB73 | 45 | 2.1 | SB73-SS02 | 45-47 | ND | #VALUE! |
| SB73 | 55 | 1.2 | SB73-SS03 | 55-57 | ND | #VALUE! |
| SB74 | 48 | 0.49 | SB74-SS01 | 46-48 | 11 | -10.51 |
| SB76 | 80 | 9.6 | SB76-SS04 | 80-82 | 3 | 6.6 |
| SB76 | 100 | 0.5 | SB76-SS05 | 100-102 | 16 | -15.5 |
| SB77 | 60 | 0.5 | SB77-SS01 | 58-60 | 11 | -10.5 |

ANALYTICAL RESULTS FOR PCE IN SOILS
(Results are in micrograms per kilogram)

| On-Site ID | Depth (feet) | Value | Off-Site ID | Depth (feet) | Value | Analytical Difference |
|---|---|---|---|---|---|---|
| MW01-1S | 15 | 0.5 | MW01-1S-SS02 | 16-17 | 11 | -10.5 |
| MW02-1D | 75-76 | 0.5 | MW02-1D-SS03 | 75-76 | 11 | -10.5 |
| MW04-1S | 25 | 0.5 | MW04-1S-SS03 | 25-30 | 10 | -9.5 |
| MW09-1D | 15 | 0.5 | MW09-1D-SS02 | 12-14 | 11 | -10.5 |
| MW09-3I | 74-75 | 0.5 | MW09-3I-SS01 | 74-75 | 11 | -10.5 |
| MW10-1D | 5 | 0.5 | MW10-1D-SS02 | 7-8 | 11 | -10.5 |
| MW13-1I | 6.8-7.2 | 0.5 | MW13-1I-SS02 | 7 | 10 | -9.5 |
| MW13-1I | 15 | 0.5 | MW13-1I-SS03 | 13-14 | 11 | -10.5 |
| MW16-1D | 8 | 0.5 | MW16-1D-SS02 | 7-8 | 11 | -10.5 |
| MW20-1D | 10 | 0.5 | MW20-1D-SS03 | 10-12 | 27000 | -26999.5 |
| MW20-1D | 20 | 0.5 | MW20-1D-SS04 | 19-20 | 27000 | -26999.5 |
| MW21-1D | 0 | 0.5 | MW21-1D-SS01 | 0-1 | 11 | -10.5 |
| MW21-1D | 10 | 0.5 | MW21-1D-SS02 | 10-11 | 26000 | -25999.5 |
| MW23-1D | 32 | 0.5 | MW23-1D-SS03 | 31-32 | 11 | -10.5 |
| MW24-1D | 87 | 0.5 | MW24-1D-SS02 | 87-88 | 11 | -10.5 |
| MW25-2I | 15 | 0.5 | MW25-2I-SS01 | 14-15 | 57 | -56.5 |
| MW27-2D | 20 | 7 | MW27-2D-SS02 | 19-20 | 3 | 4 |
| MW27-2D | 30 | 2.8 | MW27-2D-SS03 | 27-28 | 6 | -3.2 |
| MW27-3I | 46 | 9.1 | MW27-3I-SS01 | 45-46 | 17 | -7.9 |
| MW31-1D | 95-96 | 0.5 | MW31-1D-SS03 | 95-96 | 11 | -10.5 |
| MW36-1D | 15 | 0.5 | MW36-1D-SS02 | 12-14 | 11 | -10.5 |
| MW38-1I | 10 | 0.86 | MW38-1I-SS02 | 11-13 | 11 | -10.14 |
| MW38-1I | 43 | 0.5 | MW38-1I-SS03 | 41-43 | 11 | -10.5 |
| PZ03 | 10 | 0.5 | PZ03-SS02 | 9-10 | 10 | -9.5 |
| PZ12 | 0 | 0.5 | PZ12-SS01 | 0-1 | 12 | -11.5 |
| PZ14 | 10 | 0.5 | PZ14-SS03 | 10-12 | 11 | -10.5 |
| SB04 | 10 | 0.5 | SB04-SS03 | 13-14 | 11 | -10.5 |
| SB07 | 10 | 0.5 | SB07-SS02 | 8-10 | 10 | -9.5 |
| SB07 | 15 | 0.5 | SB07-SS03 | 10-12 | 11 | -10.5 |
| SB10 | 10 | 0.5 | SB10-SS02 | 8-10 | 11 | -10.5 |
| SB11 | 5 | 0.5 | SB11-SS02 | 5-6 | 10 | -9.5 |
| SB13 | 17 | 0.5 | SB13-SS03 | 16-17 | 11 | -10.5 |
| SB17 | 15 | 0.5 | SB17-SS03 | 13-15 | 11 | -10.5 |
| SB20 | 10 | 0.5 | SB20-SS03 | 10-12 | 11 | -10.5 |
| SB21 | 5 | 0.5 | SB21-SS02 | 5-7 | 11 | -10.5 |
| SB21 | 15 | 0.5 | SB21-SS03 | 13-15 | 11 | -10.5 |
| SB22 | 0 | 0.5 | SB22-SS01 | 0-1 | 12 | -11.5 |
| SB22 | 15 | 5 | SB22-SS02 | 12-13 | 2 | 3 |
| SB22 | 20 | 4 | SB22-SS03 | 20-22 | 9 | -5 |
| SB23 | 0 | 0.5 | SB23-SS01 | 0-1 | 12 | -11.5 |
| SB23 | 5 | 0.5 | SB23-SS02 | 4-5 | 11 | -10.5 |
| SB27 | 0 | 0.5 | SB27-SS01 | 0-1 | 11 | -10.5 |
| SB30 | 0 | 0.5 | SB30-SS01 | 0-3 | 11 | -10.5 |
| SB30 | 5 | 0.5 | SB30-SS02 | 4-5 | 1500 | -1499.5 |
| SB30 | 10 | 0.5 | SB30-SS03 | 8-10 | 5400 | -5399.5 |
| SB31 | 10 | 0.5 | SB31-SS03 | 8-10 | 56 | -55.5 |
| SB34 | 15 | 26 | SB34-SS01 | 14-15 | 79 | -53 |
| SB35 | 30 | 12 | SB35-SS01 | 30-32 | 11 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SB37 | 10 | 0.94 | SB37-SS02 | 7-8 | 11 | -10.06 |
| SB44 | 21 | 15 | SB44-SS03 | 21-22 | 18 | -3 |
| SB45 | 38 | 3.9 | SB45-SS01 | 37-38 | 5 | -1.1 |
| SB46 | 15 | 24 | SB46-SS01 | 14-15 | 23 | 1 |
| SB47 | 45 | 2.7 | SB47-SS01 | 44-45 | 4 | -1.3 |
| SB48 | 14 | 0.53 | SB48-SS01 | 14-15 | 5 | -4.47 |
| SB49 | 45 | 12 | SB49-SS01 | 44-45 | 14 | -2 |
| SB50 | 40 | 0.5 | SB50-SS02 | 40-42 | 11 | -10.5 |
| SB51 | 54 | 130 | SB51-SS01 | 53-54 | 180 | -50 |
| SB52 | 30 | 6.5 | SB52-SS01 | 30-32 | 9 | -2.5 |
| SB53 | 30 | 22 | SB53-SS01 | 30-32 | 21 | 1 |
| SB54 | 30 | 3.9 | SB54-SS01 | 30-31 | 7 | -3.1 |
| SB55 | 30 | 0.51 | SB55-SS01 | 30-31 | 11 | -10.49 |
| SB58 | 30 | 12 | SB58-SS01 | 30-32 | 3 | 9 |
| SB60 | 35 | 4.1 | SB60-SS02 | 37-38 | 6 | -1.9 |
| SB61 | 15 | 3.5 | SB61-SS02 | 14-15 | 2 | 1.5 |
| SB61 | 30 | 7.5 | SB61-SS03 | 30-31 | 12 | -4.5 |
| SB64 | 15 | 0.5 | SB64-SS02 | 12-14 | 11 | -10.5 |
| SB65 | 50 | 8.1 | SB65-SS01 | 48-50 | 6 | 2.1 |
| SB66 | 25 | 1.5 | SB66-SS02 | 23-25 | 11 | -9.5 |
| SB66 | 35 | 2.3 | SB66-SS03 | 35-37 | 11 | -8.7 |
| SB67 | 45 | 0.5 | SB67-SS01 | 43-45 | ND | #VALUE! |
| SB69 | 10 | 16 | SB69-SS02 | 8-10 | 10 | 6 |
| SB71 | 45 | 8.1 | SB71-SS01 | 46-48 | 16 | -7.9 |
| SB73 | 45 | 0.5 | SB73-SS02 | 45-47 | ND | #VALUE! |
| SB73 | 55 | 0.5 | SB73-SS03 | 55-57 | ND | #VALUE! |
| SB74 | 48 | 0.91 | SB74-SS01 | 46-48 | 11 | -10.09 |
| SB76 | 80 | 0.5 | SB76-SS04 | 80-82 | 11 | -10.5 |
| SB76 | 100 | 0.5 | SB76-SS05 | 100-102 | 11 | -10.5 |
| SB77 | 60 | 0.5 | SB77-SS01 | 58-60 | 11 | -10.5 |

# BIBLIOGRAPHY


Cressman, Kenneth R. "Cost Estimating of the Closure/Post-Closure Phase," Remediation: 331-339 (Summer 1991).

Devore, Jay L. Probability and Statistics for Engineering and the Sciences (Third Edition). Pacific Grove, CA: Brooks/Cole Publishing Co., 1991.

Doherty, Phillip J., Susan Chapnick, and Kim Reynolds. "Data Quality Management Under Superfund: The Cost of Quality," HMC/Superfund Proceedings: 188-191 (1-3 December 1992).

Engineering-Science, Inc. Field Sampling Plan for Remedial Investigation and Feasibility Study at WPAFB, OH; Northeastern Area Sites. Document control no. OR016/15.3/09110J52. Oak Ridge, TN: June 1992.

Environmental Protection Agency. Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites. OSWER Directive 9355.3-11. Document no. EPA/540/P-91/001. Washington: U.S. EPA Office of Emergency Remedial Response, February 1991a.

---- Data Quality Objectives Process for Superfund-Interim Final Guidance. OSWER Directive 9355.9-01. Document no. EPA/540/G-93/071. Washington: U.S. EPA Office of Emergency and Remedial Response, September 1993a.

---- Guidance for Data Useability in Risk Assessment. OSWER directive 9285.7-05. Document no. EPA/540/G-90/008. Washington: U.S. EPA Office of Emergency and Remedial Response, October 1990.

---- Subsurface Characterization and Monitoring Techniques--Volume II: The Vadose Zone, Field Screening and Analytical Methods; App. C and D. Document no. EPA/625/R-93/003b. Washington: U.S. EPA Office of Research and Development, May 1993b.

---- Superfund Reauthorization: NACEPT Subcommittee Handbook. EPA Directive 9200.1-14. Document no. EPA/540/R/93/072. Washington: US EPA, 18 June 1993c.

---- USEPA Contract Lab Program: Statement of Work For Organics Analysis--Multi-Media, Multi-Concentration. Document no. OLM01.0 (w/ revisions OLM01.1 thru OLM01.8). Washington: U.S. EPA, August 1991b.

---- User's Guide to the Contract laboratory Program. Directive 9240.0-01D. Document no. EPA/540/P-91/002. Washington: U.S. EPA Office of Emergency and Remedial Response, January 1991c.

Federal Register. National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule. 40 CFR Part 300; Vol. 55, No. 46, pg. 8666-8865. 8 March 1990.

Foley, Dr. Gary, Acting Assistant Administrator of the Office of Research and Development, U.S. EPA. Opening remarks of the 20th Annual RREL Research Symposium, U.S. EPA Office of Research &n Development. Cincinnati OH, 15 March 1994.

Helms, Pat. Project Manager, HAZWRAP-Martin Marietta Energy Systems, Inc., Oak Ridge TN. Personal Correspondence. 20 June 1994.

Lindenhofen, Hazelwood, Ethridge and Ter Maath. "Measuring Progress in DOD's Installation Restoration Program," Federal Facilities Environmental Journal: 167-182 (Summer 1993).

Mackay, Donald. Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals - Volumes I & III. Chelsea MI: Lewis Publishers, 1993.

Moody, Dr. Tim E. "Field Analysis and Mobil Laboratory Configuration for Hazardous Waste" in The MIT/Marine Industry Collegium Opportunity Brief #61. Ed. John Moore Jr. (26-27 October 1992).

Neptune, Dean. "Error and Uncertainty." Lecture at "Data Sufficiency and Decision Making for Site Remediation"; Department of Engineering and Professional Development, College of Engineering, University of Wisconsin, Madison WI. 4 November 1991.

Nielsen, David M. Practical Handbook of Groundwater Monitoring. Chelsea, MI: Lewis Publishers, Inc., 1991.

Reynolds, Prof. Daniel. Professor of Statistics, Air Force Institute of Technology, Wright-Patterson AFB OH. Personal interview. 21 April 1994.

Robbat, Prof. Albert. "On-site Detection of Organic Contaminants by Thermal Desorption Gas Chromatography/Mass Spectrometry," in The MIT/Marine Industry Collegium Opportunity Brief #61 Ed. John Moore Jr. (26-27 October 1992).

Robbins, Prof. Gary A. "Application of Field Screening Methods for Expediting and Improving Underground Storage Tank (UST) Site Assessments," in The MIT/Marine Industry Collegium Opportunity Brief #61. Ed. John Moore Jr. (26-27 October 1992).

Siegrist, Robert L. "Data Quality Management for Difficult Contaminants: Volatile Organic Compounds." Lecture at "Data Sufficiency and Decision Making for Site Remediation"; Department of Engineering and Professional Development, College of Engineering, University of Wisconsin, Madison WI. 6 November 1991.

Smith, Roy L., Senior Toxicologist, Technical Support Section (3HW13), U.S. EPA Region III. "Risk-Based Concentration Table, First Quarter 1994." Unpublished Report. U.S. EPA Region III, Philadelphia PA, 7 Jan 94.

Taylor, Michael. "Improving Tank Site Clean-up Assessments," Environmental Protection, Vol 5 No 4: 16-23 (April 1994).

U.S. EPA Office of Federal Facilities Enforcement Strategic Planning and Prevention Division. Interim Report of the Federal Facilities Environmental Restoration Dialogue Committee. Washington: February 1993.

Walsh, Col., HQ USAF/CEV. "Status of Air Force Environmental Programs." Address to Air Force Institute of Technology School of Engineering, Department of Engineering and Environmental Management students and faculty. Air Force Institute of Technology, Wright-Patterson AFB OH, 10 May 1994.

# Vita

Ronald J. Lester was born on 6 February 1958 in Lafayette, Indiana. He graduated from Purdue University with a Bachelor of Science in Geology (Specialty: Geophysics) in December 1980. Upon graduation, Ron was employed by Cities Service Oil & Gas Corp. in Tulsa, Oklahoma where he completed an eight month exploration training program, after which he was transferred to Oklahoma City to work as an exploration geophysicist. He was employed by Cities Service, becoming Occidental Petroleum Inc., until July 1987. At this time he relocated to Hanscom Air Force Base in Massachusetts to work for Dynamac Corp. as a contracted hydrogeologist for the Air Force. His responsibility was the management and technical support of the Installation Restoration Program at Hanscom AFB. In February 1988 Ron accepted a civil service position with the Air Force, remaining at Hanscom. He accepted a position in the Wright-Patterson AFB Office of Environmental Management in January 1989, where he was the Remedial Design/Remedial Action Program Manager for the Installation Restoration Program at the base. In this position he established several on-call remedial action contract mechanisms, the first of their kind in the Air Force, and was responsible for the first hazardous waste site clean-up activities conducted at WPAFB. In November 1990 Ron was promoted to the Chief of the Restoration Branch in the WPAFB Office of Environmental Management where his responsibilities included the management of an annual Installation Restoration Program budget of $20-30 Million and a technical staff of 15-18 people. He was awarded the 1992 AFMC Environmental Restoration Award for Individual Excellence and received Honorable Mention recognition for the same at the Air Force level. Following completion of the Graduate Environmental Engineering and Management program at the Air Force Institute of Technology he will return to his position as Restoration Branch Chief at WPAFB.

Permanent Address:
3787 Greenbay Drive
Dayton, OH 45415

# REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188



**1. AGENCY USE ONLY** *(Leave blank)*

**2. REPORT DATE**
September 1994

**3. REPORT TYPE AND DATES COVERED**
Master's Thesis

**4. TITLE AND SUBTITLE**
Optimal Utilization of Field Generated Analytical Data for Site Characterization and Remedial Decision Making

**5. FUNDING NUMBERS**

**6. AUTHOR(S)**

Ronald J. Lester, GM-13

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**

Air Force Institute of Technology, WPAFB OH 45433-6583

**8. PERFORMING ORGANIZATION REPORT NUMBER**
AFIT/GEE/ENV/94S-13

**9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)**

**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**

**11. SUPPLEMENTARY NOTES**

**12a. DISTRIBUTION/AVAILABILITY STATEMENT**

Approved for public release; distribution unlimited

**12b. DISTRIBUTION CODE**

**13. ABSTRACT** *(Maximum 200 words)*

This study developed data quality standards for assessing environmental analytical data quality and its use in remedial decision making, specifically in risk assessment calculations. The primary purpose was to increase the use of field generated data in environmental site investigations versus the continued reliance on costly and time consuming EPA Contract Lab Program data. Increased reliance on field lab data could significantly reduce remedial investigation costs. The standards developed are based on regulatory criteria for data useability, achievable quality in a CLP lab setting, and basic statistical methods. The standards were applied to sets of Volatile Organic Compound data in water and soil matrices from CLP generated data from one Installation Restoration Program site and field lab generated data from another site. The CLP data failed the test for data useability based on the standards as established where the field generated data performed much better but also had its specific failures. The results of the test of the standards on actual data sets indicate that the standards may be more stringent than necessary. Also seen in the results is a strong performance of field labs in generating data of acceptable quality.

**14. SUBJECT TERMS**
Environmental Data Quality, Analytical Data (Environmental), Remedial Investigations, Risk Assessment, Contract Lab Program, Field Labs

**15. NUMBER OF PAGES**
222

**16. PRICE CODE**

| 17. SECURITY CLASSIFICATION OF REPORT | 18. SECURITY CLASSIFICATION OF THIS PAGE | 19. SECURITY CLASSIFICATION OF ABSTRACT | 20. LIMITATION OF ABSTRACT |
|---|---|---|---|
| Unclassified | Unclassified | Unclassified | UL |

NSN 7540-01-280-5500

Standard Form 298 (Rev 2-89)
Prescribed by ANSI Std Z39-18
298-102